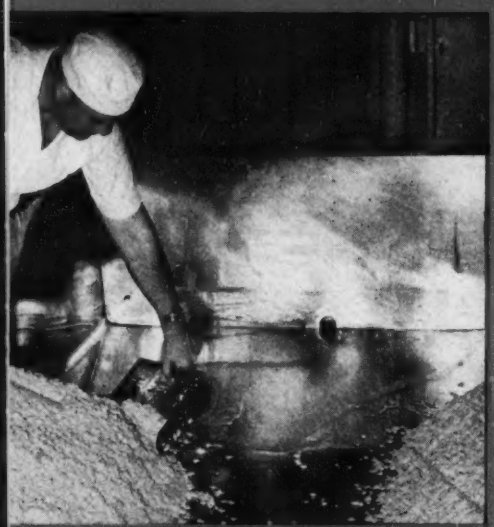
NOVEMBER 1954

35 CENTS

FOOD ENGINEERING

A McGRAW-HILL PUBLICATION



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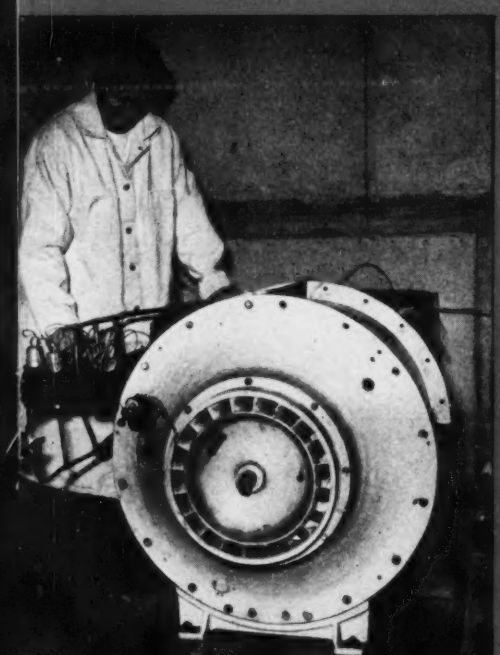

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MATERIALS HANDLING • PACKAGING • TRANSPORTATION
QUALITY CONTROL • INSTRUMENTS • PRODUCTS

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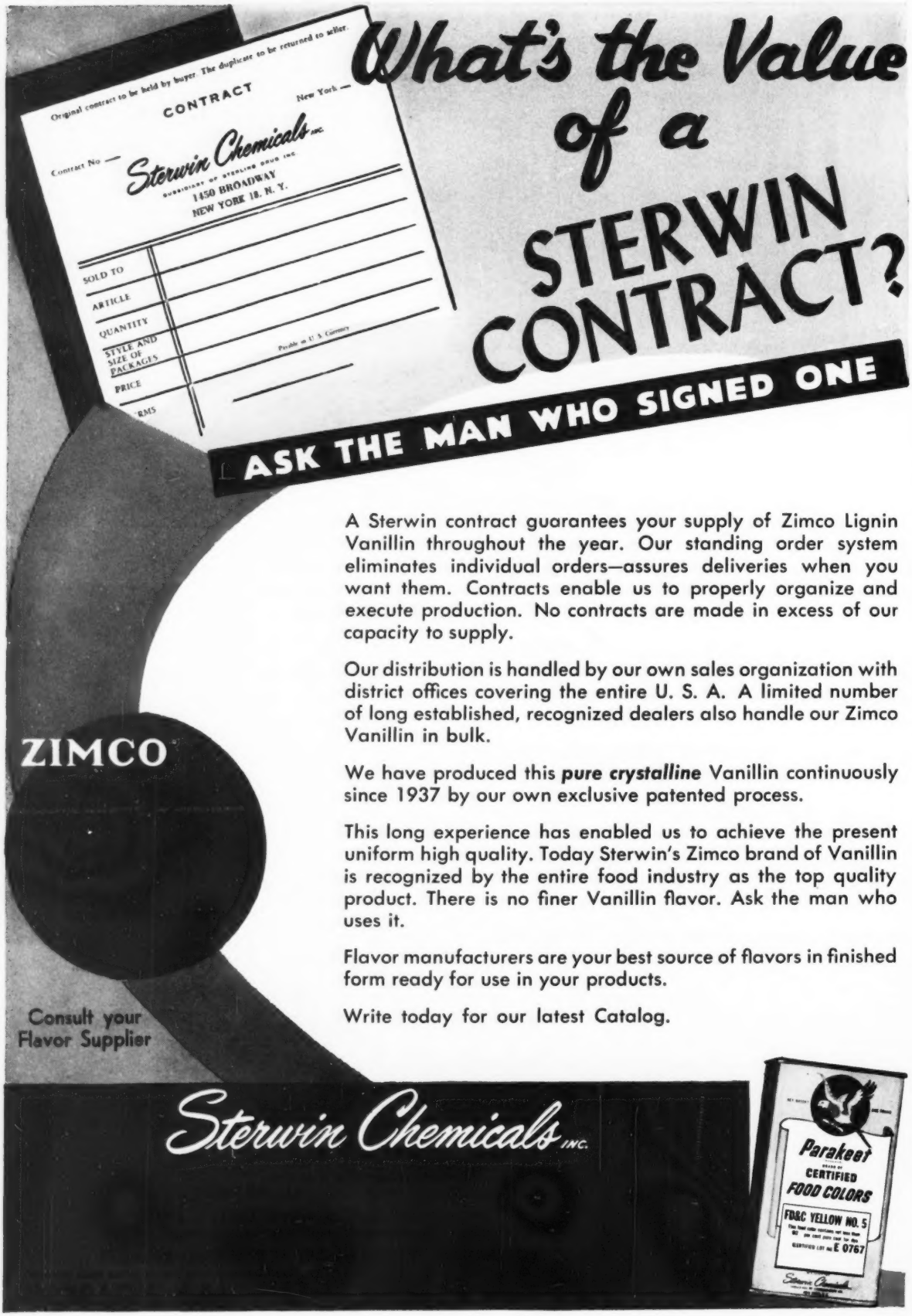
INQUIRY COUPON INSIDE BACK COVER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Our distribution is handled by our own sales organization with district offices covering the entire U. S. A. A limited number of long established, recognized dealers also handle our Zimco Vanillin in bulk.
We have produced this pure crystalline Vanillin continuously since 1937 by our own exclusive patented process.
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November 1954

Volume 26 Number 11

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It takes Six Bolts -

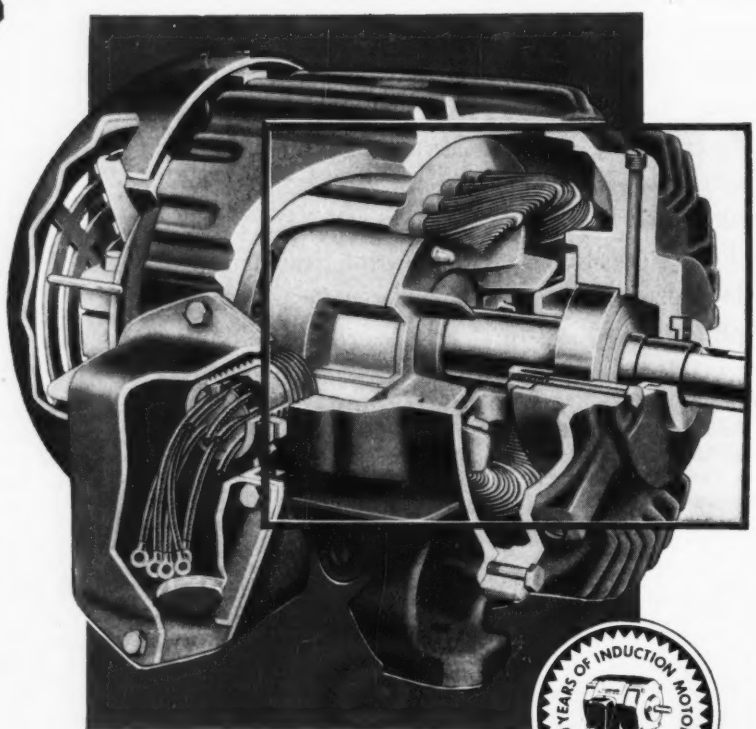
not just four

to give full bearing protection for greater motor performance

THE TWO EXTRA BOLTS in the end housing of every Allis-Chalmers ball bearing motor are the proof of *extra* protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Result? Allis-Chalmers motors pay off in longer, trouble-free bearing life, lower motor maintenance.



Get all the facts . . . judge for yourself — Compare Allis-Chalmers motors with other motors. Get the six-bolt construction that gives you complete bearing protection. For proof, see your Allis-Chalmers Office or Authorized Distributor, or write — Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

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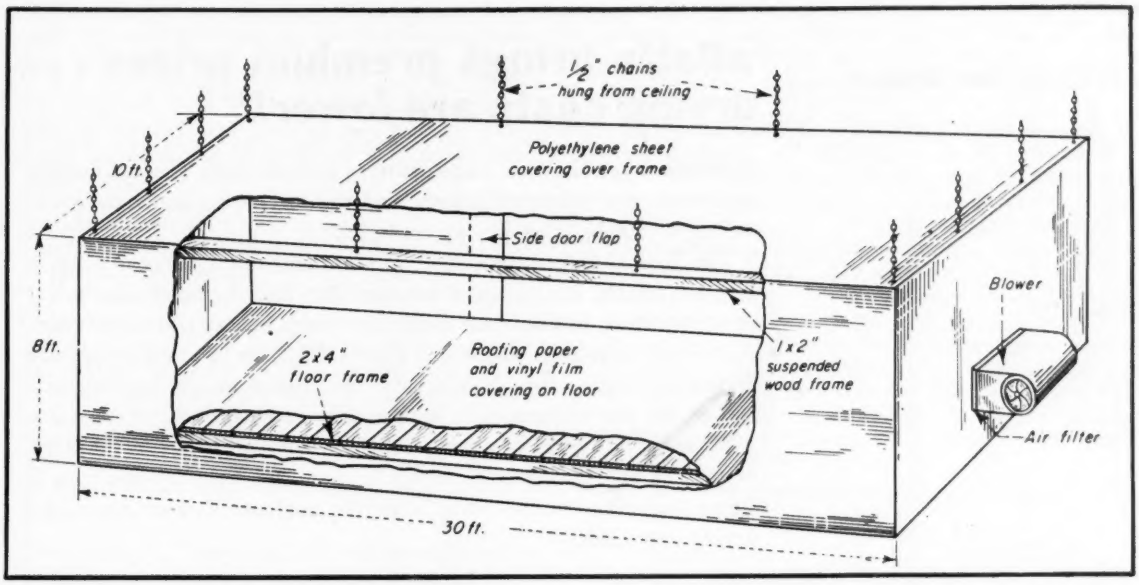
PRACTICAL IDEAS



Easy Way to Make Dustproof Room

A simple and inexpensive dustproof enclosure has been set up in our plant. Problem was to keep out dust during one of our experimental packaging operations without constructing an expensive dust-free room. In our specific case, dust particles of very small size damaged a thin plastic film that we were testing.

Our new dustproof "room" has worked out so satisfactorily that we feel other users, particularly in the food industry, should find it satisfactory in operations where dust should either be absent or confined.

It consists of a 1x2-in. horizontal wooden frame, chain-suspended from the ceiling. Used are 14 chains (½ in.) to hold up the 10x30-ft. frame a distance of 8 ft. off the floor. Draped over this frame and tucked under a floor-bolted 2x4-frame (also 10x30 ft.) is a thin-gage polyethylene sheet. Laid on the floor of this room is first a layer of felt roofing paper and then sheets of 4-mil vinyl film, sealed at the joints with lacquered tape.

Positive pressure is created by blowing air through one side of this room with a 12-in. squirrel-cage blower to slightly balloon the polyethylene sides and top. Before entering the room, however, air passes through four 18x24-in. Fiberglas filters. Air is exhausted through a side-flap door or through holes that have been pierced in the polyethylene sidewalls.

If negative pressure is desired, a suction fan can be installed inside the room and at the roof. Fan can then pull air through side flap or holes in sidewalls of polyethylene.—*G. T. Schjeldahl, President and General Manager, Herb-Shelly, Inc., Farmington, Minn.*

Repairing Pipe Leaks With Plastic

Polyester resin and Fiberglas can be used in the rapid repair of leaks or breaks in pipelines. Such repairs are most helpful at inconvenient places where welding is awkward or impossible and where it would be necessary to take down a considerable part of the line to replace the leaking section or fitting.

At GF's Atlantic Gelatin Div., we employ the following procedure, suitable for use on pipelines for hot or cold water, corrosive liquids, sewer drains, and low-pressure steam:

1. Shut off service on the line. As soon as leaking stops, patch can be applied. If this does not stop flow, further action is necessary. For instance, you might break a union of flange upstream in the line to drain away fluid, disconnect line which is source of the liquid, or use any temporary method of stopping the hole—with a wooden plug, putty held in place with friction tape, or binding tightly with electricians' tape or sheet rubber. Occasional drops can be tolerated while applying patch, but continuous flow washes liquid resin from the glass cloth, and patch will not be tight.

2. Clean pipe 6 in. either side of the leak, removing grease and dirt with soap and hot water. Steel wool or a coarse rasp will remove loose rust and paint, but it is not necessary to go down to bright metal.

3. Prepare resin in a disposable container, such as a can or paper carton. A typical formula is polyester and styrene mixed well with 2% catalyst paste and from 2 to 5%

FOOD ENGINEERING
(Formerly Food Industries)
November 1954 Vol. 26, No. 11
Member ABC and ABP

Published Monthly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. **Publication Office 99-129 N. Broadway, Albany 1, N. Y.**

Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President & Treasurer; John J. Cooke, Secretary; Paul Montgomery, Executive Vice-President, Publication Div.; Ralph B. Smith, Vice-President and Editorial Director; Nelson Bond, Vice-President & Director of Advertising; J. E. Blackburn, Jr., Vice-President & Director of Circulation.

Subscriptions: Address correspondence to Food Engineering—Subscription Service, 99-129 N. Broadway, Albany 1, N. Y. or 330 W. 42nd St., New York 36, N. Y. Allow one month for change of address.

Subscriptions are solicited only from the executives, engineers, and technologists in food processing plants. Position and company connection must be indicated on subscription orders.

Single copies 35¢. Subscription rates—U. S. and possessions $2 for 1 yr., $3 for 2 yr., $4 for 3 yr. Canada, $3 for 1 yr., $4 for 2 yr., $5 for 3 yr. Other Western Hemisphere countries and the Philippines, $10 for 1 yr., $16 for 2 yr., $20 for 3 yr. All other countries, $15 for 1 yr., $25 for 2 yr., $30 for 3 yr. Entered as 2nd class matter Aug. 26, 1948, at Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U.S.A. Copyright 1954 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved.

Louisville Method

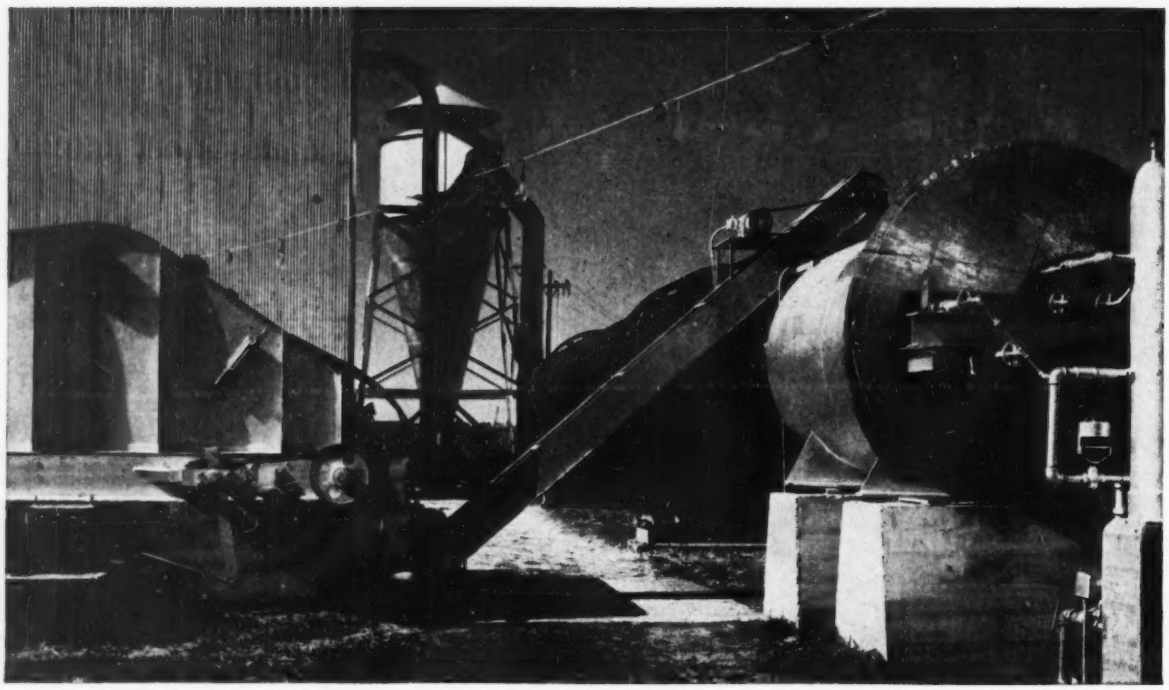
Type H Dryer User Reports . . .

"alfalfa brings premium prices . . . drying costs are *lower!*"

Louisville Type H Dryer keeps carotene content high. This top quality commands top prices anywhere. And the big production capacity of this dryer means lower drying costs, too.

The Type H Dryer, developed to retain maximum carotene value in chopped alfalfa, is also useful for handling other feedstuffs, including sweet potatoes, bagasse and sugar beet pulp, pea and soybean vines, green corn, vegetable waste, etc. Its combination of low temperature drying and large capacity will save you money on production costs and enable you to turn out a high quality product.

With our 53 years of drying experience for all types of industry, we may be able to add extra profits for you, too. Write for our Type H Dryer bulletin. Or ask for a Louisville engineer to look over your drying operation.



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accelerator. The 2% accelerator formula hardens in 1 hr., while the 5% hardens in 20 min.

Brush the resin formula over cleaned area of pipe generously, going around pipe and 6 in. on both sides of leak. Wrap Fiberglas tape (1½ in. wide or wider, depending upon pipe dia.) or Fiberglas cloth, cut into strips, around pipe and for the length wet with resin.

It is important that Fiberglas be wrapped tightly with about one-half width overlap. End of tape should be kept tight by splitting and tying or by wrapping with cord. Resin formula is then brushed into layer of tape until it is well saturated.

In like manner, at least two more layers of tape are wrapped tightly, each layer saturated with resin. Finally, taped area is bound with glass cloth kept tight with string or glass rovings and saturated with resin.

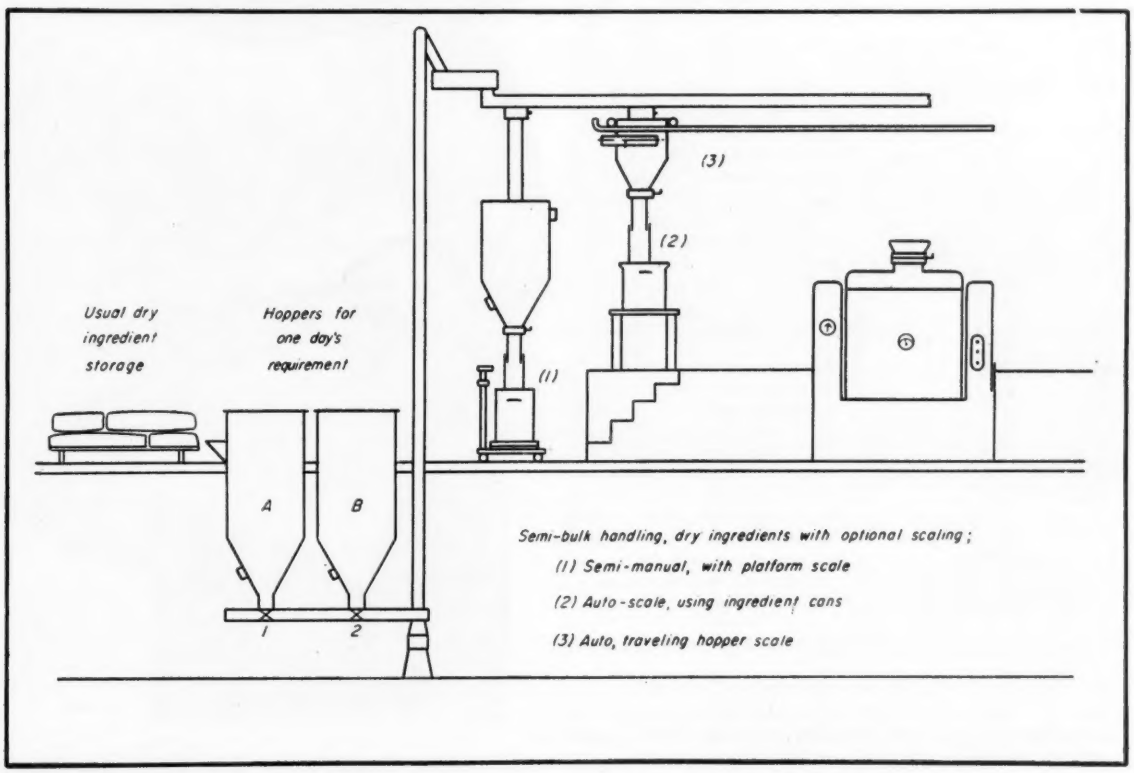
4. If ambient temperature is 70°F. or over, this patch will be hard and ready for service in from 20 min. to 1 hr. after last resin is applied. If down-to-freezing temperatures prevail, it may take several times as long for patch to harden.

In any case, hardening may be hastened by warming with a hot air blast or with an infrared lamp, taking care that resin does not become over-heated, since this will cause it to lose viscosity and drain out of Fiberglas, leaving voids.

Our first use of this technique was in repairing a leak in the bottom of a "Y" in a 4-in. all-welded steel drain line. The pipe was so thin and corroded in the area of the leak that welding merely enlarged the hole. This was a rather awkward place to apply a first patch, but the clumsy patch held tight from the start and has given 10 months' satisfactory service.

Later, the entire line, consisting of five branches, was entirely covered with three layers of Fiberglas cloth and resin. There have been no further pipe leaks, although in that time five cast-iron gate valves failed and were replaced with Saran-lined valves. In this case, it is possible that the laminated temporary patch will serve as a tight drain line long after the steel pipe is corroded away.

Kits containing all materials necessary for repairing leaks or breaks in piping are available. One unit is an adaptation of equiment supplied the Navy for emergency patching. It is now standard equipment on many ships. There is also an introductory and training kit suitable for making repairs and for proving the method.—*Bror J. Grondal, Engineering Dept., Atlantic Gelatin Div., General Foods Corp.*



Semi-Bulk Handling System

Special supply hoppers are very convenient where two or more materials, such as sugar and milk powder, are used in a fixed proportion in successive batches during the day, as in the case of bakeries. The hoppers—(A) and (B) in sketch—need be filled manually but once a day.

These storage containers discharge through feeders onto a conveyor system that delivers the mixture to the weighing station. By means of proportioning controls, as little as 0.1% of one ingredient, or as much as a 50-50% mixture may be prepared.

Conveying system moves the correctly proportioned mixture to a conveniently located hopper for manual scaling, where such is desired, or for auto-electric scaling.

Closed system assures maximum sanitation and also saves up to one man's time per day.—*T. H. Barnard, Clinton Foods, Inc., Clinton, Iowa.*

Safety Trick for Truck Drivers

When a truck comes to a stop quickly—for a car, traffic signals, or turn—there is always a risk that a car following the truck will collide with the back of the vehicle. A truck body often prevents the driver behind it from seeing what is happening ahead.

But there is a little trick in driving which will greatly

• HOW FOOD PROCESSORS

SAVE

IN PREPARING VEGETABLES WITH TOUGH SKINS

SAVE TIME

New engineering features of the advanced-design Standard FMC High-Pressure Steamer greatly reduce time requirements for loosening certain vegetable and fruit skins. Carrots, for example, are processed at a capacity of 5 to 7 tons per hour under 25 to 30 seconds exposure to steam pressure.

SAVE MANPOWER

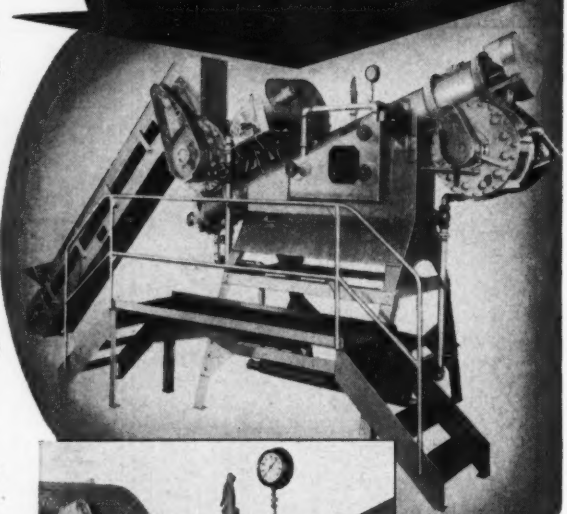
Built for smooth, continuous flow-line operations, the FMC Steamer overcomes processing bottle-necks, reduces manpower formerly required on non-automatic lines. Accurately controlled heat penetration loosens all skins uniformly, makes the job of skin elimination easy, quick and thorough.

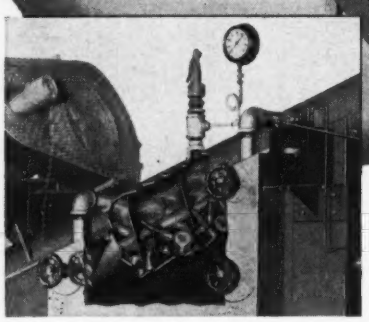
SAVE MONEY

An increase in yield of 10% or more over other methods of loosening skins is not uncommon with the *Standard* Model FMC High-Pressure Steamer, shown at right. The *Special* Model, with many new features, increases capacity from 25% to 50%. Both models provide a very low waste factor, and steam requirements are exceptionally nominal.

In addition to big all-around savings, processors find that the automatic control of heat penetration provides complete and uniform loosening of skins without damage to valuable sub-surface nutritional layers. Such vegetables as carrots, beets, potatoes and many others (primarily root types), and certain fruits, such as apples, are carefully, quickly and continuously processed to insure a premium quality pack.

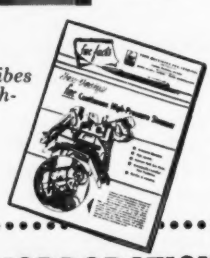
WITH THE *fmc* CONTINUOUS HIGH-PRESSURE STEAMER





Cutaway view shows carrots being moved through the inclined pressure chamber by screw conveyor.

Write for Bulletin *which illustrates and fully describes the FMC Continuous High-Pressure Steamer, or call your nearest FMC representative for complete information.*



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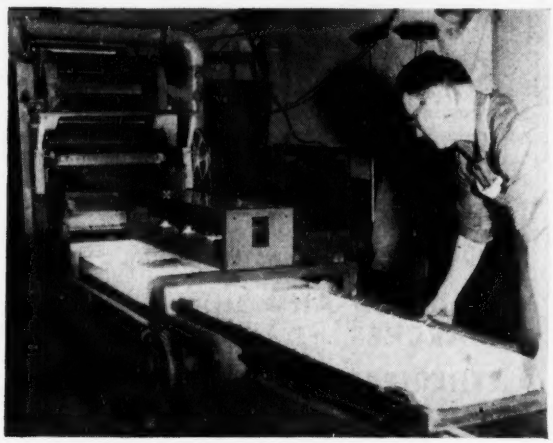
reduce this rear-end collision hazard. It is this: When a truck driver knows that he must stop, he brakes his vehicle to slow speed faster than necessary. Then he lets the truck roll slowly forward for a short distance before bringing it to a dead stop.

This early braking action warns the driver behind and causes him to apply his brakes sooner than he otherwise would. And the slow roll-up of the truck gives the driver behind it the precious extra distance to stop when he needs it.

By watching the car behind in his rear-view mirror, the truck driver can gage his slow-down and roll-up for a maximum safety.—*FE Staff*



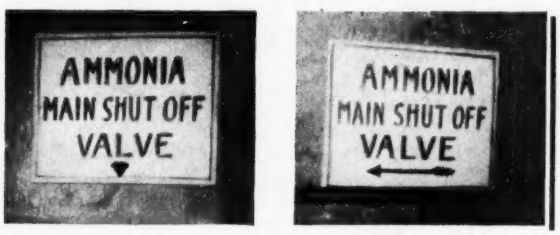
Infrared Drying Ups Production

By installing an infrared drying unit on our processing line, we get 57% more noodle production in the same space, and improve quality at the same time.

Formerly, cut noodles were sent directly to a conventional hot air dryer. But when moisture was not removed quickly enough, noodles would stick together. Then production was lost in rerunning them through the cutting machine.

Reprocessing is now eliminated with the infrared unit, which acts as a pre-dryer. It's positioned (see the photo) above a conveyor at the delivery end of the cutting machine. Here the 30-sec. drying time, immediately after the noodles come from the machine, removes a high percentage of moisture. Final drying is then completed in the hot air dryer.

With this method we also have increased rack capacity by loading to a greater depth. And quality is improved by producing a fluffier noodle.—*Roth Noodle Co., Pittsburgh.*

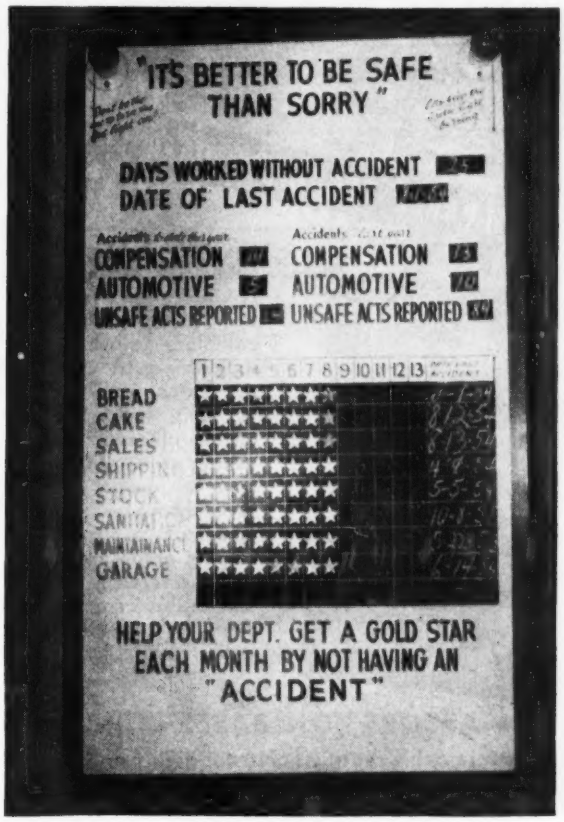


Ammonia Valve Emergency Signs

In case of emergency, workmen not familiar with the location of the main ammonia shut-off valve in a food-plant refrigeration system can find the valve with the aid of signs posted in pertinent positions in the plant.

Also in case of fire, the signs will aid the men of the local fire department.

As shown in the photos, two types of signs may be used, both with big red letters. One is directly above the main valve. When the valve is hidden, another sign, with an arrow pointing in the direction of the valve, is posted in a conspicuous place.—*Carl Usinger, Chief Engineer, Fred Usinger, Inc., Milwaukee.*



Competitive Spirit Curbs Mishaps

In our plant we have found that the competitive spirit, stimulated by posting the monthly accident rate of each department in the company, has materially reduced the number and severity of accidents.

The figures go up on bulletin boards mounted throughout the plant. And these figures speak for themselves as to the success of the method.

Presently recorded data indicate that '54 automotive accidents will probably run only about half what they were last year. Up to the middle of September of this year, reported unsafe acts totalled only 24, as compared to 84 for last year.

These unsafe acts are reported by employees on special forms accessible to them at all times. For instance, it was noted that a sloping wood floor, across which trucks travel, sometimes became slippery. As suggested, strips of emery cloth were glued to the floor for safety and better traction.

Added stimulant to safety precautions is the lighting system for the bulletin boards. A green light burns at the upper right as long as there are no accidents, and a red light burns on the left after each accident.

For safety-record purposes, the year is divided into 13 periods. A gold star is placed in the space for each depart-

NATURAL WATER SOLUBLE GUMS

- GUM ARABIC
- GUM KARAYA
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- **ABSORPTION BASES**

More stable starting points for highly profitable creams, lotions, and cosmetic products. TELL US OF YOUR NEEDS.

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Starches in their various forms are most reliable compounding ingredients for many drug, food and chemical products. See the big variety listed below available from MORNINGSTAR.

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Paisley Products Inc. adhesive manufacturing division of Morningstar, Nicol, Inc. gives you an adhesive consulting service without cost or obligation. Hundreds of concerns in every industry depend upon the recommendations of our adhesive chemists and engineers for uninterrupted operation of their packaging, sealing and labeling lines. • Send for an Adhesive Operation Data Sheet. Fill in and return it for laboratory analysis and recommendations. We work with all adhesive raw material bases, and can select the proper performance grades for your requirements. Buy your Glues and Adhesives the scientific way. This service does not obligate you in any way. Write today.

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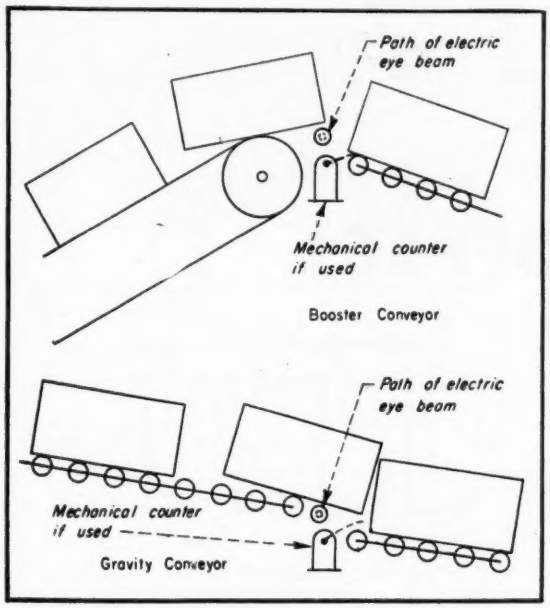
Morningstar Scientific Starch, Dextrine and Natural Gum Service is available through all sales and service offices of Paisley Products Inc. Division of Morningstar, Nicol, Inc., which are located in principal cities.

ment at the end of each accident-free period. A red star in a department space indicates one or more accidents have marred the record.

This bulletin board competition has helped to make safety everybody's business.—*Walter J. Holmes, American Bakeries Co., Jacksonville, Fla.*



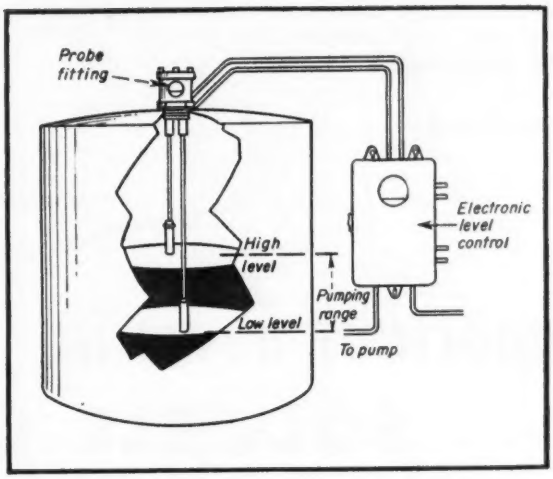
Breaks Carton Line for Count

Counting filled cartons on booster elevator or gravity conveyor systems posed a problem in our plant. With either mechanical or electronic devices, a space must be maintained between cartons to permit reset of the counter. But in traveling along these conveyors, adjacent cartons would butt together and be counted as one.

So we devised a system which provides space under each carton during part of its travel. And this method is applicable to various types of conveyors, and to either mechanical or electric-eye counters.

Diagrams above show how cartons pass over a hump or a dip at the junction of conveyor flights, leaving a space under each carton momentarily. And this provides the required opening for resetting a mechanical counter or for passage of a light beam running an electronic device.

When the mechanical counter is used, care must be taken to offset the position of the counter arm from the center line of the carton. This is necessary to prevent the counter from resetting itself in the gap between carton flaps and counting one carton as two.—*Richard H. Bradford, Plant Superintendent, Comstock Foods, Inc., Fairport, N. Y.*



Conductive-Liquid Level-Control

Accurate maintenance of both minimum and maximum levels in a tank or vessel can be attained readily by an electronic level control, if the liquid will conduct an electric current.

Two probe rods are suspended into the tank from a fitting attached to the top. Probe rods (see sketch) wired to the level control, project into the tank to levels at which pumping is to start and stop. When the level of liquid in the tank falls below the lower probe, the level control closes the electric circuit, starts pump motor and the tank fills. When the liquid rises to the level of the upper probe, the fluid itself acts as a conductor of the current required for the operation of the level control. This opens the electric circuit to the motor, and the pumping operation stops.—*Photoswitch, Inc., Cambridge, Mass.*

"Quickie" Paint Mixer

If a ¼-in. electric drill is available, a very fast and efficient mixer for paint can be made in a few minutes.

Here's how it's done: Take a 20-in. piece of heavy-gage wire. This wire should be about the size of that used in a coat hanger—the wire, in fact, can be cut from a coat hanger.

Bend the wire double and at the same time shape a flat-bottom loop of about 3-in. diameter at the doubled end. Bring the two free ends together and insert them in the chuck of the electric drill, and you have your paint mixer.

This device is extremely handy for mixing paint in cans after the lid is removed to assure a uniform distribution of the pigment. It also is very effective for attaining a uniform mixture of any color added to the paint.—*FE Staff*

CAN YOU USE $50?

Then here's an opportunity to get it.

Send one of your ideas to FOOD ENGINEERING.

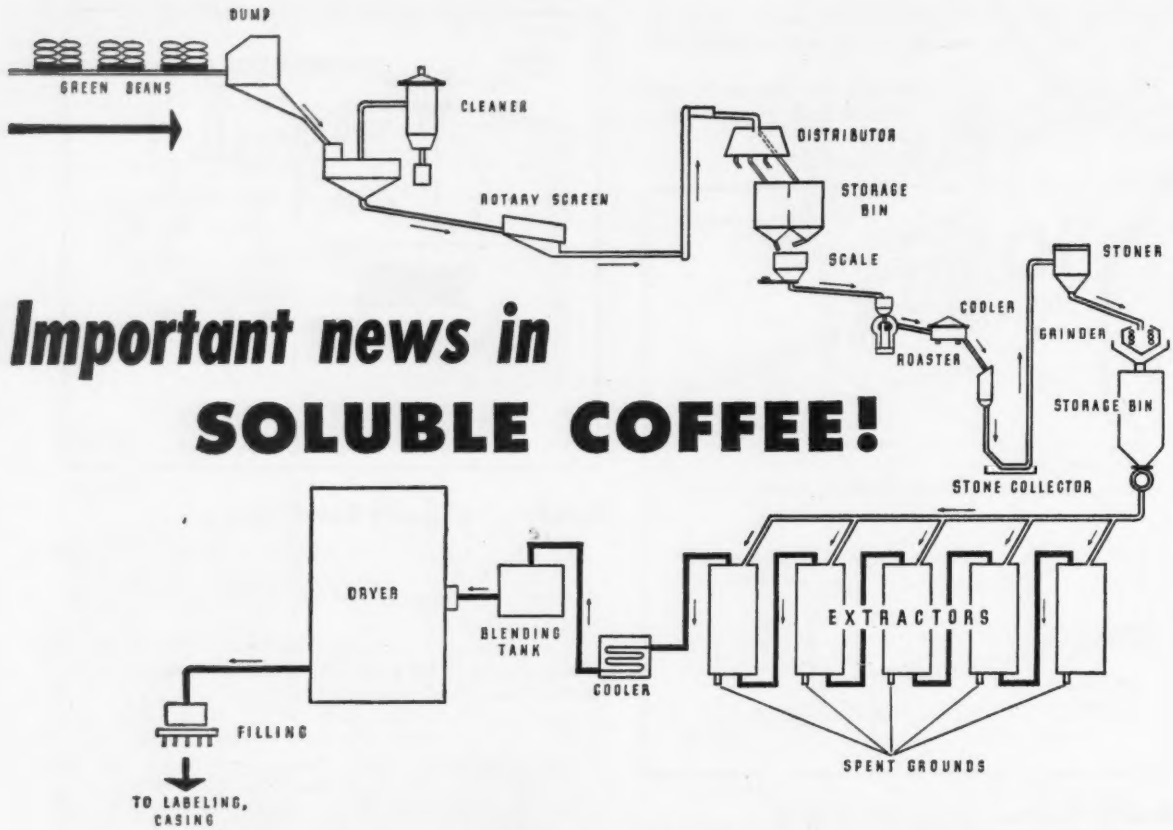
Each month $50 is presented to someone like you for the best item in this department. And the chance that it will be you is now running about one in twelve.

Also, $5 to $15 is paid for each contributed item used. So a few minutes time may net you as high as $65.

Just send us the facts about your idea and its application. And include a free-hand sketch or snapshot to illustrate it.

We'll do the finished writing and drawing for you. Send it today, before you forget. Address it to Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.—The Editors

SEPTEMBER PRACTICAL IDEA WINNER was "Freezer-Door Safety Control", submitted by A. F. Cordley, Electrician, Bird's Eye Frosted Food Corp., Hillsboro, Ore.



Important news in SOLUBLE COFFEE!

This new soluble coffee system gives you everything you need to blend your own!

Now you can get *your* share of the sky-rocketing sales in the "instant" coffee business!

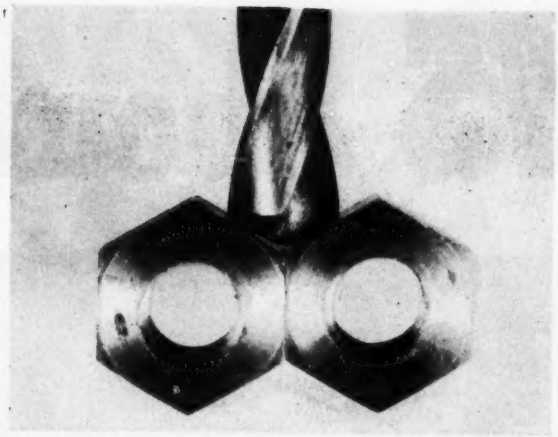
Although it comes to you as a "packaged process," this Pfaudler system can easily be controlled to produce the flavor you want—maintaining the desirable flavor characteristics of your present brand of roasted coffee.

Right from the raw bean down through the steps of cleaning, roasting, extracting, drying and packaging, this new Pfaudler process gives you fingertip control. The extraction and drying of the roasted bean to produce soluble coffee is continuously regulated to produce a good, uniform product.

You can rely on the results because this process has been engineered by The Pfaudler Co.—we've been serving the food industries for 70 years. Pfaudler high-speed filling machines, percolators, processing vats, storage tanks and other food processing equipment are helping hundreds of food processors increase production and get a higher quality product. Pfaudler's standard designs and easy-to-clean alloy or glassed steel construction make this possible.

Get into the profitable soluble coffee business. You don't have to work out your own process, or track down equipment for it. Pfaudler will design, procure and fabricate everything you need. A complete plant layout will be furnished. If you desire, we can also handle erection and furnish start-up service. Write for the full story on soluble coffee.

THE PFAUDLER CO. Pfaudler **ROCHESTER 3, N. Y.**



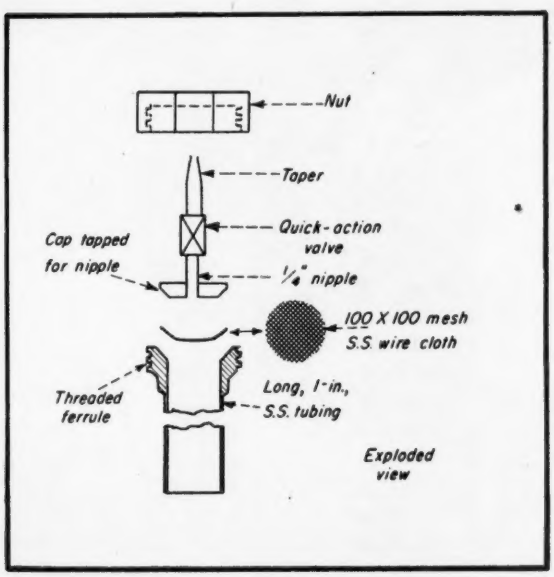
Two Nuts Make a Drill-Grinding Gage

A gage, suitable for checking the angle of a twist drill, can be easily constructed with two standard hexagonal nuts.

On maintenance work, the mechanic is rarely provided with precision equipment to insure that his cutting tool is operating at top efficiency. But this handy gage, which indicates an angle of 120 deg., allows a quick check in one simple operation. Although the standard angle for grinding the cutting lips of a twist drill is 118 deg., for all practical purposes 120 deg. is close enough.

The gage consists only of the two hex nuts held with their flat faces in contact (photo). Thus, adjacent sides form a 120-deg. recess into which the drill point is inserted for checking the lip angle. When properly ground, the drill's cutting lips are flush with the sides of the recess.

Simplest arrangement is to hold the nuts together by hand. But a more permanent gage results when they are soft-soldered or brazed.—*C. T. Bower, London, England*



Accurate Deep-Bin Sampler

For taking a sample of powder from a deep bin, here is a device which not only insures an accurate test, but which is easily constructed.

First, take a length of 1-in. stainless steel tubing long enough to reach the bottom of the bin. On one end of this tube (see diagram), place a threaded ferrule, with a nut to fasten a cap and a screen element to the ferrule.

Make a beveled cap with a hole into which is inserted a ¼-in. nipple, and taper the nipple on one end so that it will slip into a piece of rubber hose. Fit a quick-action valve into the nipple.

To fit beneath the cap, cut a circle of 100x100-mesh wire cloth, which will keep the powder from passing through. If desired, a piece of cotton flannel can be inserted between two wire screens to retain finer powders.

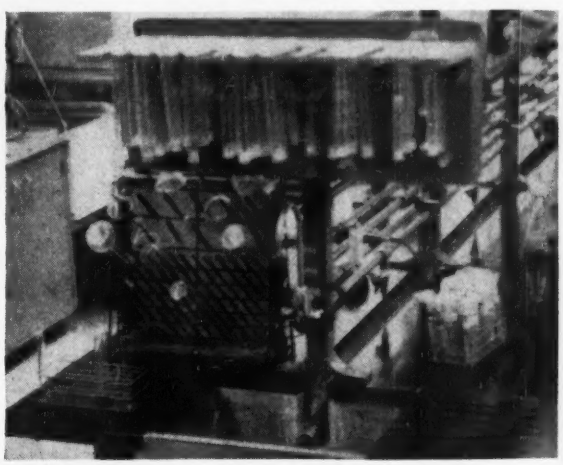
When taking a sample, slip a hose on the nipple and connect the hose to a vacuum line. Open the valve to get good suction in the tube, then push the tube rapidly to the bottom of the bin and close the valve. Now remove the suction hose and pull the tube out of the bin. Open the valve and gently tap the tube to discharge the sample into a container.

If the powder is coarse and inclined to fall out of the tube, hold the vacuum until ready to deposit the sample.—*Martin C. Rochlk, Assistant Superintendent, The Borden Co., Perry, N. Y.*

More on Elevated Work Shop

Readers have asked us who developed the handy "Portable Elevated Work Shop" described in this department of the August issue of FE, page 13.

The unit was devised by Emery Transportation Co., Chicago, to service motors and compressors on the company's refrigerated trucks.—*The Editors.*



Rack Keeps Lab Glassware Clean

When washed laboratory glassware, such as a graduated cylinder, is put on a conventional drainboard, drying is retarded by retention of water in the lip of the graduate.

However, an easily constructed rack, on which graduates drain in an inverted position, speeds drying and also keeps the interior of the glassware free of dust and contamination. Thus, a supply of clean, dry, cylinders is assured. And at the same time, more space is provided on the conventional drainboard for glassware of irregular shapes.

Shown in the upper portion of our photo, this rack consists of a shelf with a series of parallel slots a little wider than the diameter of a cylinder. And the slots are spaced widely enough apart to provide clearance between the bases of cylinders in adjacent rows.

When inserted into these slots, the inverted cylinders are supported by their bases. And a sizable number may be suspended from a small shelf.—*Oakite Products, Inc., New York City.*

BIG NEWS about

Rigidly controlled conditions are established for comparative analyses by United States Testing Company, Inc., Hoboken, N.J., in multiple testing stations like this.

FISH STICKS !

New taste test shows that MSG can double consumer preference!

Here's important news for everyone who makes, sells or buys frozen fish sticks.

Famous United States Testing Company, Inc., reports that you can *double* consumer preference for your fish sticks by simply adding MSG at the Huron-recommended level of .18%. This conclusion is based on a scientific taste test (Psychometric) of treated and untreated fish sticks.

What the test revealed

67% of the taste panel preferred fish sticks with MSG added at the .18% level, to 33% who chose the untreated samples. What's more, 67% also preferred MSG at the .18% level, while only 33% went along with sticks treated with .05 MSG (the "usual" level). This finding completely confirms the .18% level long advocated by Huron.

What the test means to you

Whether you process, sell or buy frozen fish sticks, this test means you can actually "build in" your product a taste appeal that's preferred by twice as many consumers. That's a tremendous competitive advantage which is bound to put your product on top. It spells more sales . . . more profits in today's booming frozen fish sticks market. We'll be glad to send you a free copy of the United States Testing Company, Inc., report covering this taste test.

Don't forget — Huron MSG can heighten the flavor of most frozen foods — meats, poultry and vegetables as well as fish. Write or phone our Technical Service today for all the facts on this easy way to make your brand the one people prefer. THE HURON MILLING CO., 9 Park Place, New York 7, N.Y. B.4.6

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Made by the American pioneers in protein derivatives

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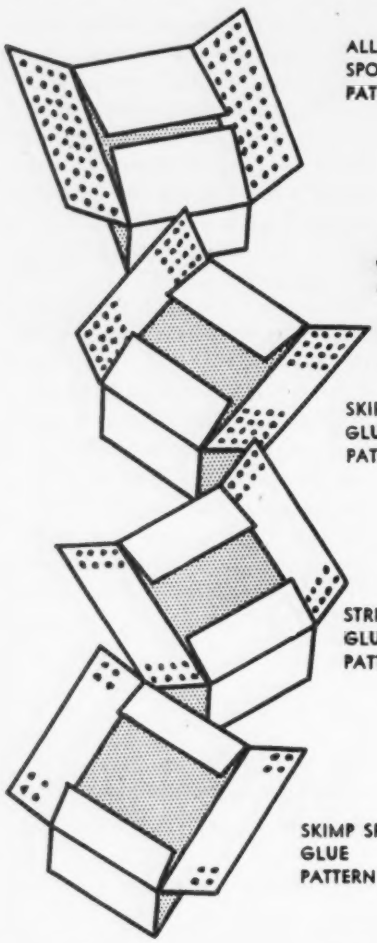
Announcing the PACKOMATIC
PACKER-GLUER

THE ONLY ALL NEW SHORT CASE SEALER

Applies glue and seals all types of paper cases

APPLIES GLUE IN SPOT PATTERNS

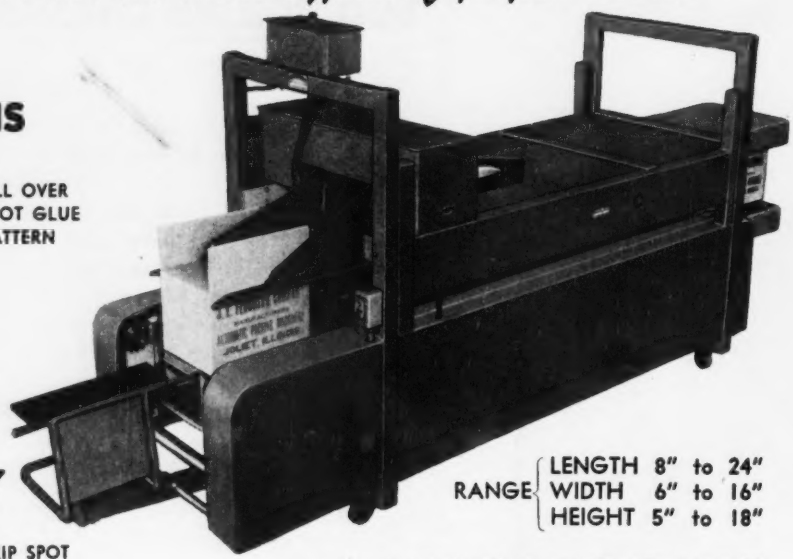


ALL OVER SPOT GLUE PATTERN

SKIP SPOT GLUE PATTERN

STRIP SPOT GLUE PATTERN

SKIMP SPOT GLUE PATTERN



RANGE { LENGTH 8" to 24" / WIDTH 6" to 16" / HEIGHT 5" to 18" }

SPEED { 8 12-INCH-LONG CASES PER MINUTE / 4 24-INCH-LONG CASES PER MINUTE }

The Packomatic Packer-Gluer is intermittent in operation. The operator packs the case on a packing table and moves it slightly forward, where it contacts a starting trip. All other operations are automatic.

Glue applying system is ALL NEW. By applying glue to the outer case flaps in spots at ¾" centers each spot has the advantage of being aerated around its entire circumference, allowing the glue to spread and become absorbed much faster than when it is applied in an all-over design where the roll applying method is used. Spot application of glue makes a faster, tighter adhesion.

The Packomatic Packer-Gluer occupies less than 30 square feet of floor space; has fewer moving parts than any sealing equipment on the market.

Applies glue to inner surface of outer flaps while flaps are in a vertical position

---

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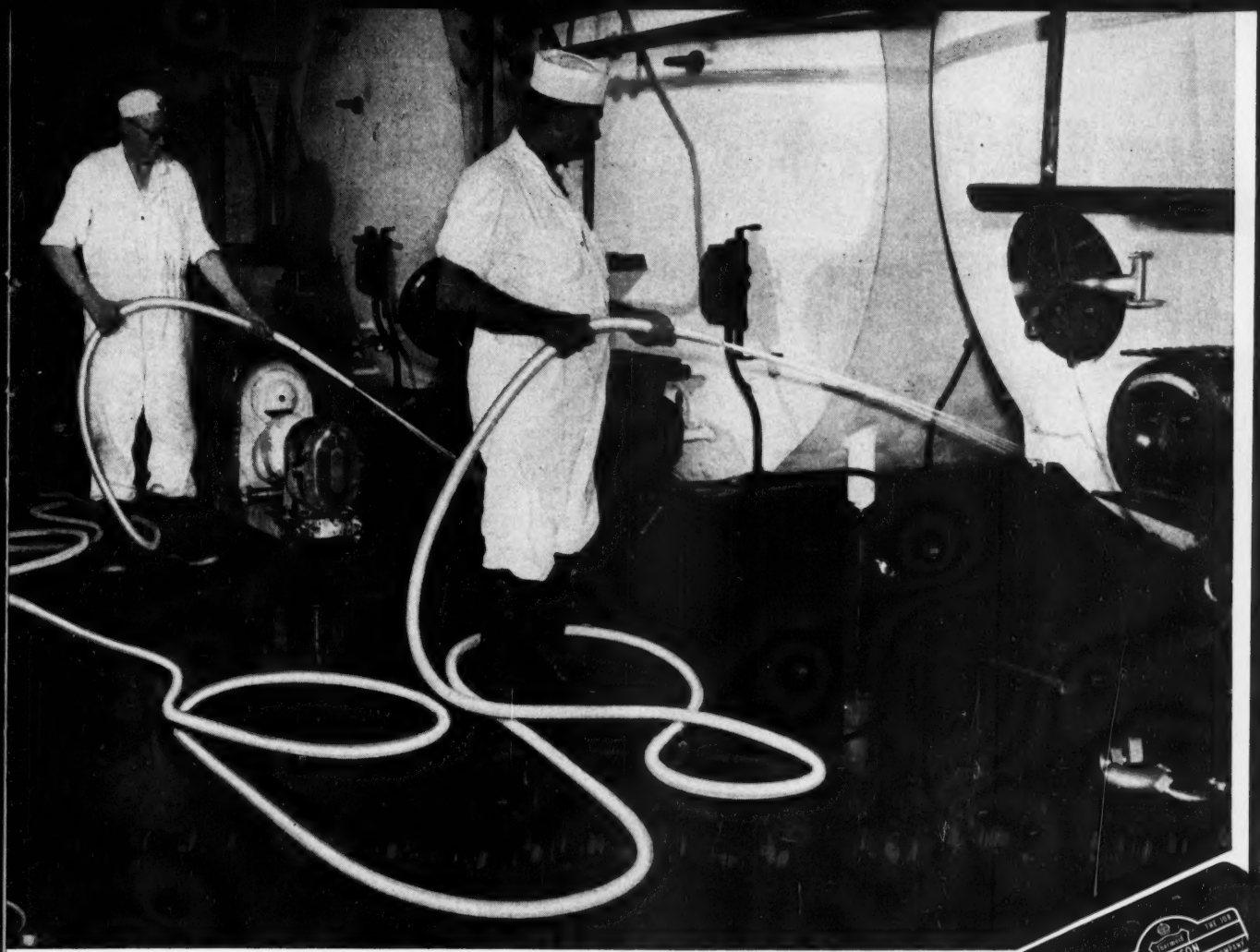

Thermoid Hose designed specifically for use in food processing plants

Thermoid designs and manufactures many types of hose for a wide variety of specific industrial applications. These 3 are ideal for use in food and beverage plants:

VERSICON most versatile hose ever developed. Handles air, water, oil, gasoline, dilute acids and gases.

CREAMERY for use with hot or cold water and low pressure steam, for cleaning and sterilizing.

BREWERS for use in breweries, wineries and food plants. Imparts no taste or odor.

Your Thermoid Distributor carries a full line of Thermoid Hose, Conveyor Belting and Multi-V Belts to meet your most exacting requirements. He maintains complete stocks and can give you fast service. If you prefer, write direct.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

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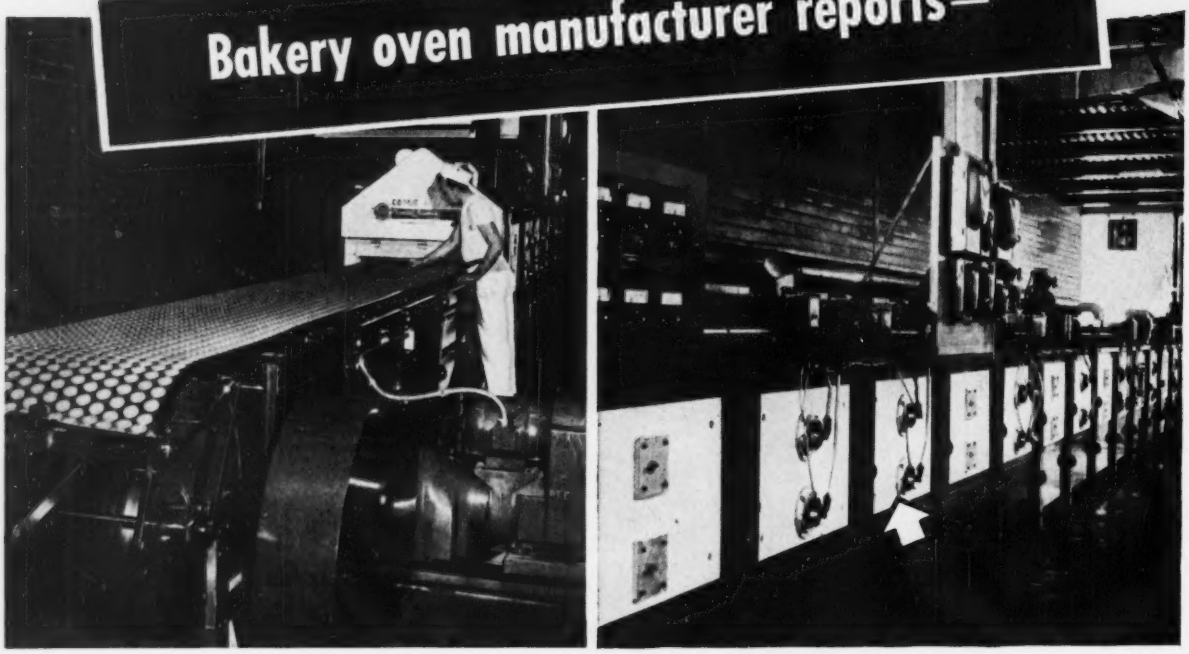
Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

Bakery oven manufacturer reports—



Thomas L. Green & Company's new 100-foot band oven, built and insulated with Johns-Manville Marinite (shown by arrow above). Photos by courtesy of "Rippin' Good Cookies," Ripon, Wisconsin.

"Faster heating ... better performance"

for ovens built of J-M Marinite
the non-corroding, structural insulating material

This leading bakery oven manufacturer, who designs for lasting customer satisfaction, obtains several major advantages by using Johns-Manville Marinite*, the structural insulating material:

(1) Marinite-built ovens heat up faster than ovens with all-metal construction. (2) Marinite provides better heat control and more flexibility —temperatures may be quickly raised or lowered for baking different products. (3) Marinite saves space and weight, yet affords the same thermal insulating effectiveness as blanket-type insulation supported by heavy metal construction.

Equipment users find other advantages . . . In addition to superior performance, operators of ovens, driers and other high temperature equipment obtain almost unlimited service life from Marinite. This asbestos material combines structural strength and durability with efficient thermal insulation. It requires virtually no maintenance. It does not rot or corrode. It will not disintegrate in water. It requires no finish or protective facing for normal service.

To learn how Marinite can improve your equipment, write Johns-Manville, Box 60, New York 16, N.Y. In Canada, 199 Bay St., Toronto 1, Ontario.

JOHNS-MANVILLE JM PRODUCTS

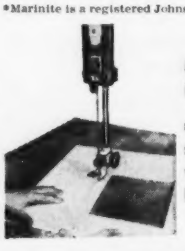
*Marinite is a registered Johns-Manville trade mark.

MARINITE builds and insulates in one operation

large sheets speed construction, afford maximum heat control

MARINITE is strong

provides structurally strong monolithic walls—requires minimum angle-iron framing



MARINITE is easily worked

may be cut, drilled, shaped with ordinary woodworking tools, by plant labor

Johns-Manville *FIRST IN* INSULATION

MATERIALS • ENGINEERING • APPLICATION

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by FIRMENICH

gives finer flavor...
greater sales appeal...
to your products

You get the direct and authentic reproduction of raspberries in their full perfection in Raspberry Flavor by Firmenich. For Firmenich took fully ripe raspberries, freshly severed from the stem, captured their delicate and fugitive flavor, and by original research reconstructed it in all its significant and desirable components. Firmenich Raspberry comes to you as a precise and potent flavor material of the utmost purity and stability to enhance the flavor of your products and to make them more attractive to your customers.

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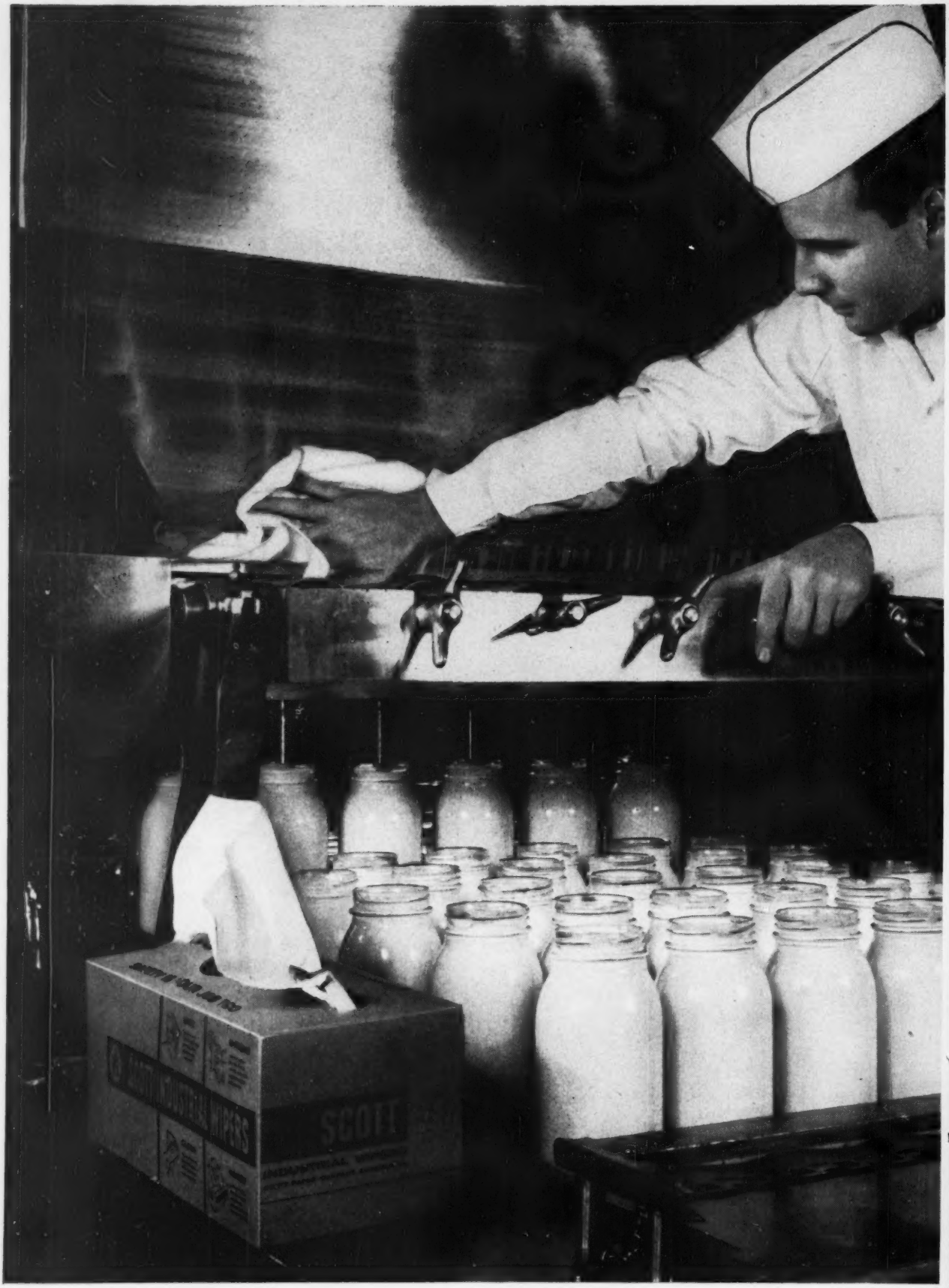
SCOTT

NOW–**Scott** brings you a disposable wiper!

And here at last is a wiper that's tailor-made to the needs of the food industry. Called the Scott Wiper, it's sanitary, strong, highly absorbent and designed to do every wiping job in your plant.

Best of all, the Scott Wipers are disposable. Use one thoroughly—throw it away—take another. You'll have a constant source of clean wiping material when and where you need it. No more laundering . . . no more buying expensive wiping materials.

Compare Scott Wipers with whatever wiping material you now use. Compare them for cost, convenience, performance.

The Scott representative or distributor in your area will be glad to help you set up a production line demonstration. Call him or mail this coupon today.

Scott Paper Company, Dept. FE-2, Chester, Pa.
Please send information on Scott Wipers.

Name_____ Company_____

Address_____

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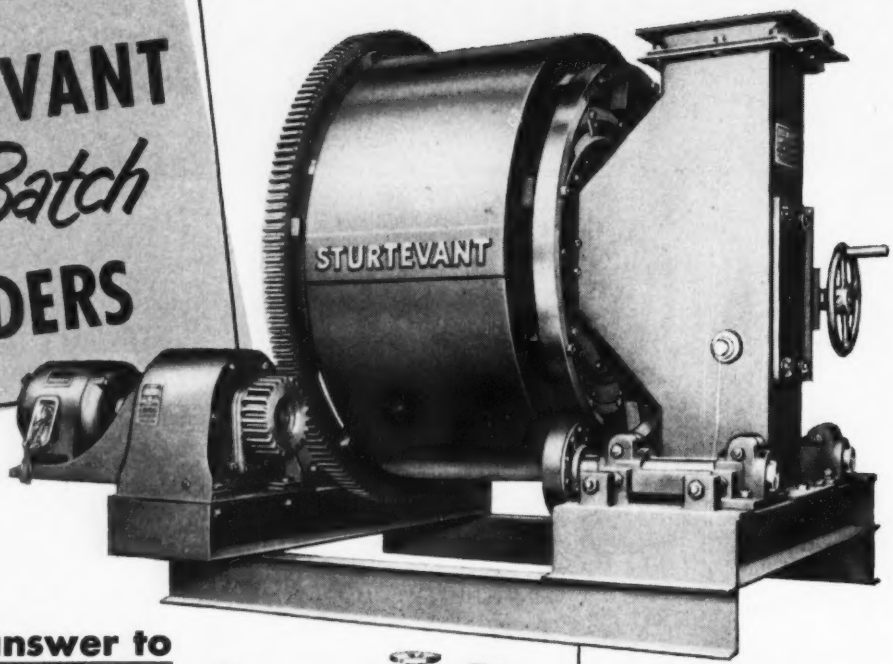
STURTEVANT *Dry Batch* BLENDERS



are the answer to

Fast, Economical Mixing

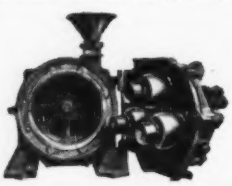
Because of the unique design of its mixing chamber, and the 4-way mixing action which brings two or more substances together, the Sturtevant Dry-Batch Blender does a more rapid mixing job than other machines and, at the same time, it is complete and thorough in every particular. The substances may be of different weights and physical properties, and may be either dry, partly dry, or a mixture of both. Write for bulletin today.

Compare These Advantages

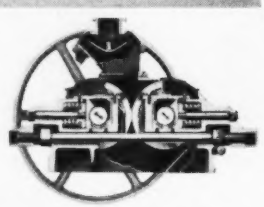
- Only one lever controls both receiving and discharging for simplicity of operation. Hand wheel operates rack and pinion slide at feed opening.
- 4-way mixing action speeds production . . . assures thorough blends.
- "Open-door" accessibility permits easy, fast, thorough cleaning.
- Single aperture drum for both intake and discharge.
- Unusually efficient scoops pick up materials to effect thorough mixing as drum revolves.
- 9 models . . . a size for every job . . . from 10 cu. ft. to 900 cu. ft. batches.

Micronizer® Grinding Machine. A fluid jet grinding machine, the Sturtevant Micronizer speeds reduction of materials to low micron sizes. These jet mills are especially applicable in fields where a particle size in microns is desired. Available for outright sale.

Air Separator — for separation of fines to 325 mesh and finer. Increases output from 25% to 300% . . . lowers power costs by 50%. Capacities ¼ to 50 tons per hour output.

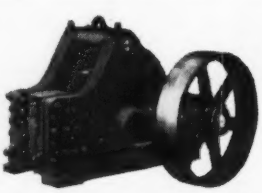


Ring-Roll Mills — for medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operated in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.



Crushing Rolls — for granulation, coarse or fine, hard or soft materials. Automatic adjustments. Crushing shocks balanced. For dry or wet reduction. Sizes 8 x 5 to 38 x 20. The standard for abrasives.

Rotary Fine Crushers — for intermediate and fine reduction (down to ¼"). Open door accessibility. Soft or moderately hard materials. Efficient granulators. Excellent preliminary Crushers preceding Pulverizers.



Jaw Crushers — for coarse, intermediate and fine reduction of hard or soft substances. Heavy or light duty. Cam and Roller action. Special crushers for Ferro-alloys. Several types, many sizes.

STURTEVANT MILL COMPANY

106 Clayton Street, Boston 22, Mass.

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MECHANICAL DENS AND EXCAVATORS • ELEVATORS • MIXERS

Sorbitol . . .
for better taste and texture

A wholesome and nutritive food ingredient, sorbitol helps to retain the palatability and softness of cake and cookie toppings and fillings, shredded coconut, confections and numerous other food products. It not only stabilizes moisture, but also produces desirable improvements in texture, resulting in uniform high quality . . . in fudge, protein whips and marshmallows. The bodying effect of sorbitol lends added acceptability to soft drinks. Sorbitol retards hardening and loss of moisture in seasonal confections which must be produced in advance of peak consumption periods.

A new 21-page booklet, "Sorbitol . . . Its Advantages and Methods of Use in Confections and Other Foods," gives valuable information on how sorbitol can improve food products, and includes a number of typical recipes. Write to Atlas today for your copy, and for samples of sorbitol for experimental use.

Write today for your copy of this 21-page booklet.

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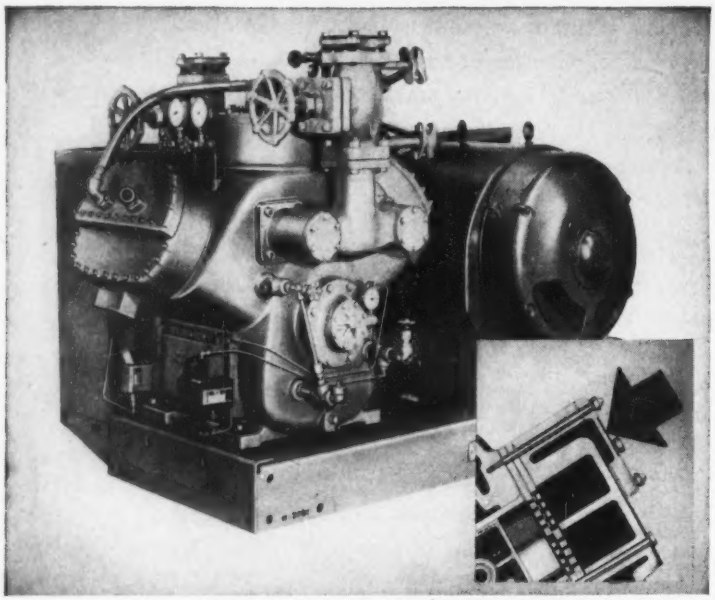
For more information, use coupon on last page.

Look at all the features of Worthington's new high-speed ammonia compressor



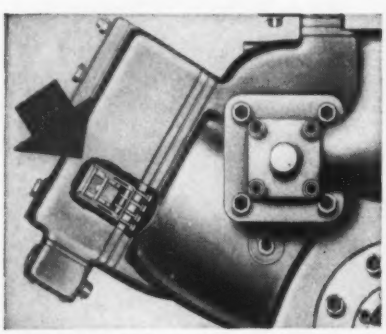
IMPROVED INTERNAL MANIFOLDING—cool suction gas completely surrounds the cylinder walls, providing longer valve life and increased overall efficiency. All passageways between suction discharge and shutoff valves are cast integrally within the crankcase, eliminating outboard fittings. Cross section shows water jacketing on one of the cylinders.

High operating efficiency and lighter weight make this modern unit the talk of the industry

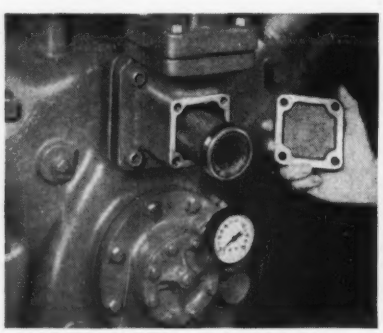
These lightweight, compact Worthington ammonia compressors have the same high operating efficiency and versatility as their lower speed counterparts.

Ranging in capacities from 18 to 150 tons, the new units can be used as high-stage or booster machines.

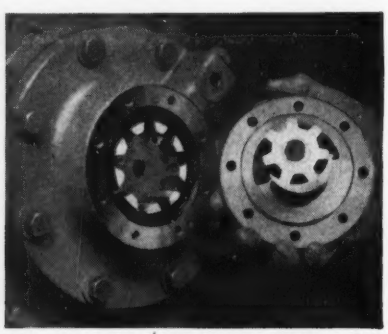
Get in touch with your nearest Worthington district office for more facts about these rugged compressors. Or write to Worthington Corporation, Air Conditioning and Refrigeration Division, Section A.3.56, Holyoke, Mass.



ELECTRIC UNLOADING—a new achievement in variable capacity control. You can start compressor with a normal torque motor; power consumption is automatically balanced against load. Separate unloader units allow easy maintenance . . . no oil or gas pressure lines to worry about.



NEW SUCTION MANIFOLD, with cover plate over suction strainer inlet, allows easy removal of the suction gas strainer for cleaning, without disturbing any of the pipes, valves or other parts. The strainer is unique in that it fits entirely within the crankcase manifold, requiring no additional space.



NEW FORCE-FEED LUBRICATION SYSTEM — full pressure, positive lubrication, regardless of rotation. A new rotary oil pump, driven directly by the crankshaft, eliminates complicated and noisy gear trains. Oil is filtered through a strainer in the crankcase for protection of pump and other moving parts.

A.3.56

WORTHINGTON

CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME

FIBRE DRUMS?
STEEL SHIPPING CONTAINERS?
STEEL EQUIPMENT CONTAINERS?

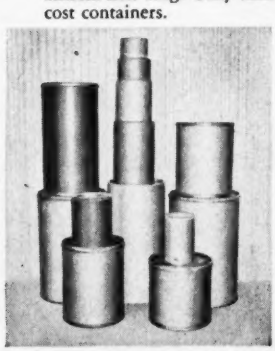
GET THEM ALL... GET THEM FAST...
from
RHEEM

RHEEM Announces a Complete Line of Fibre Drums to Provide an All-Inclusive Shipping Container Service

To supplement its line of steel shipping and custom equipment containers, Rheem has added a complete line of Fibre and Fibre-Metal drums. These strong, light weight, inexpensive drums come in four types and in a wide variety of sizes.

Choose the Drum that Fits Your Needs

Choose the type that best fits your needs — All-Fibre drums, or Fibre-Metal drums with steel bottoms with either slip or friction covers or with the new, easy to install and remove Rheem-Lox ring. Only Rheem offers all these types of low cost containers.



Choose the Size that Fits Your Needs

Choose the size that best fits your needs. Fibre drums from 1- to 32-gallons in capacity; Fibre-Metal drums from 5- to 60-gallons. There is virtually a size for every possible requirement.

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MANUFACTURING COMPANY

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NOW, More than ever before, You Can Rely On Rheem for all your shipping container requirements

RHEEM STEEL CONTAINERS ARE MADE IN SEVEN STRATEGIC LOCATIONS

Rheem Fibre Drums are being manufactured in four of these plants. Production lines are scheduled for installation in other plants soon.

30 gal. Rheem Fibre-Metal Drum — 55 gal. Rheemcote Steel Drum

"FAMILY" IDENTIFICATION

Rheem can furnish on Fibre drums the same type of decorative service it provides users of Rheemcote lithographed steel drums. Any design or trade mark can be reproduced on an all-over label for Fibre drums in any number of colors to provide "family" identification for your products.

MAIL COUPON NOW!

RHEEM MANUFACTURING COMPANY
(Mail to Nearest Sales Office, Listed at Left)

☐ We would like to have your packaging engineers come to our plant and study our shipping container problems.

☐ Please send additional information.

NAME OF COMPANY_____

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BY_____

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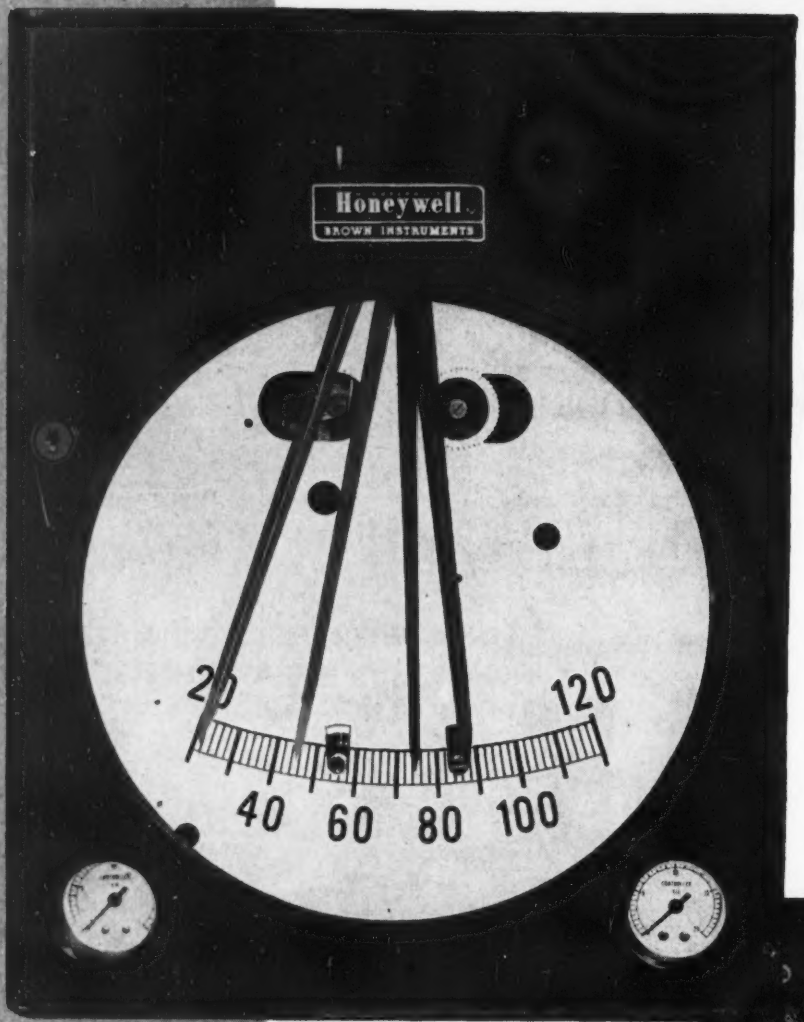
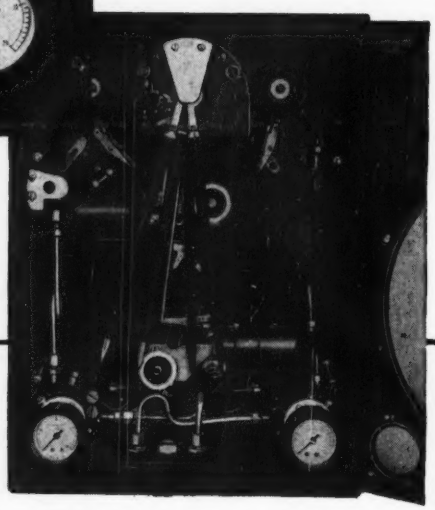




Interior view of Controller case, showing dual thermal systems and dual control units . . . all packaged into one compact, space-saving assembly.

Designed for Versatility!

Clear indication
color-coded pointers show set point and measured value for each temperature.

Choice of thermal systems
dual systems with the same actuation and range can be selected from these types: Vapor, for –40 to 600° F. . . . Gas, for –125 to 800° F. . . . Mercury (either case-compensated or capillary-compensated) for –40 to 1000° F.

For relative humidity
special stainless steel wet and dry bulbs in common armor, for ranges from 20 to 120° F.

Choice of control
any of the following combinations can be supplied: both systems on-off control . . . both systems with 10% *Throttlor* proportional control . . . or one system on-off and the other with 10% *Throttlor*.

Versatile

new instrument controls two temperatures at once

. . . ideal for bakeries, boil tanks, smokehouses

FLEXIBLE, concentrated indication and control of two temperatures is now possible, with the new Brown Indicating Thermometer Controller. This latest member of the Brown instrumentation line for food plants has numerous applications in varied processing operations.

As a combined wet and dry bulb instrument, it affords simplified control of humidity in bread-proofing rooms, bakery fermentation rooms, smokehouses, and similar air-conditioned areas. As a dual dry-bulb instrument, it centralizes control of boil tanks . . . and practically any other moderate-temperature equipment for which a temperature record is not required.

Built into a single, compact case are two independent indicating and controlling systems. Color-coded pointers indicate measured temperature and set point for each system, on an easily-read concentric scale. To accommodate a variety of equipment, there is a choice of control combinations. Both systems can have on-off control, both can have 10 per cent *Throttlor* proportional control, or one of each type of control action can be incorporated.

Thermal systems of the vapor, gas and mercury types are available to cover ranges from –125 to + 1000° F. All thermal systems are built to give the best in accuracy and dependability . . . factory-assembled with leak-proof, rugged construction features.

Your nearby Honeywell engineer will be glad to discuss how this new controller can be applied to the processing equipment which you manufacture or use. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA:** Write for Bulletin 6430, "New Dual Indicating Temperature Controller."

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls

OUT OF THE "BUFFALO"

PUNISHMENT PIT—

COME BETTER FANS FOR YOU

"Buffalo" Type "BL" Limit-Load Ventilating Fan

"Buffalo" Axial Flow Fan

• To be sure that "Buffalo" rotors can stand far greater stress than they would ever encounter in an installation, we deliberately try to destroy them in this "Buffalo" vacuum test pit! Here, in a partial vacuum, the rotor to be tested can be revolved at tip speeds as high as 60,000 and even 70,000 feet per minute. The slightest unbalance, the slightest structural weakness, would result in destruction of the rotor at these fantastic speeds — and it shows up here in the Punishment Pit, not in the installed fan.

This is just one phase of the rigid testing and excellence of engineering, or "Q" Factor*, which assure you of a best buy when you specify "Buffalo" Fans. Why not write for "Buffalo" engineering literature on *your* air handling problem?

**The "Q" Factor — The built-in Quality which provides trouble-free satisfaction and long life.*

BUFFALO FORGE COMPANY

152 MORTIMER STREET BUFFALO, NEW YORK

Publishers of "Fan Engineering" Handbook

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

VENTILATING PRESSURE BLOWING AIR CLEANING COOLING AIR TEMPERING HEATING INDUCED DRAFT FORCED DRAFT EXHAUSTING

hit the trail...

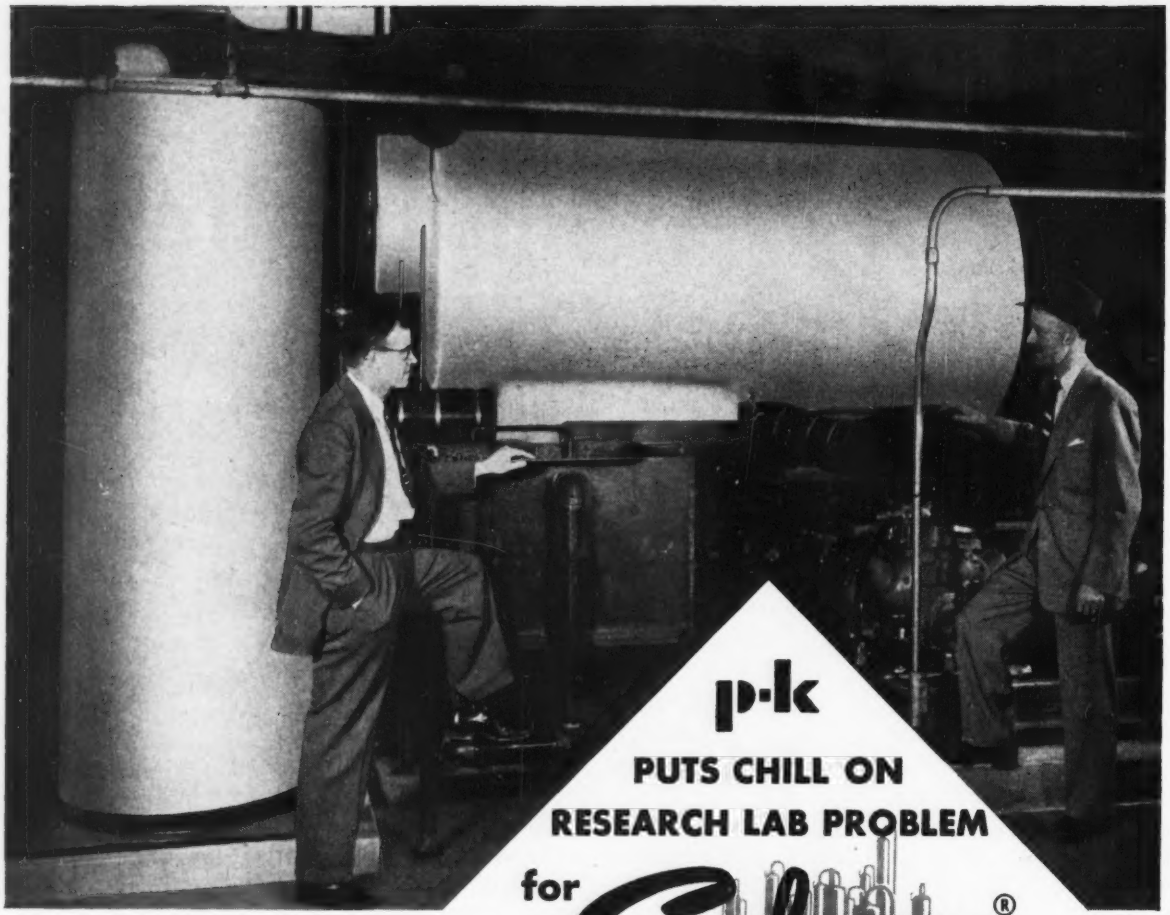
. . . by using Western Waxed carton overwraps—the most *appealing, sparkling, brightest,* and *toughest* wrappers available to the frozen meat and poultry industry—*to give you the most outstanding brand identification to sell your product.*

Western's carton overwraps are the best because through the facilities of Crown Zellerbach we offer a complete service—from forest to you—including the world's largest supply of long fiber stock, a fully-staffed creative art and design department, our famous Packaging Research and Development Laboratory, and the latest equipment and methods in the packaging industry—*all at your service to provide you with the best frozen food wrappers!*

...to increased sales!

WESTERN WAXED PAPER

DIVISION CROWN ZELLERBACH CORPORATION
SAN LEANDRO, CALIFORNIA
Plants & Sales Offices at Los Angeles, Portland, Ore.
Manufacturers of Mullinix Lightproof Packages



p-k

PUTS CHILL ON RESEARCH LAB PROBLEM

for Celanese® CHEMICALS

John Armstrong (right), president of Delta Engineering and Conditioning Co., East Orange, N. J., and A. G. Scott, Celanese plant engineer, discuss final details of the installation just prior to putting the system into service.

To solve a problem, first get to the center of it; and that's just what the engineers of Celanese and Delta Engineering did at the Celanese Corp. of America's Summit, N. J. research lab.

The nub of the problem called for controlled temperatures to be made available throughout the building for research and pilot plant work. The solution centers on a **p-k** brine storage chiller centrally installed in the basement. Around it is the system of the closed-circuit type, composed of compressor, pumps, brine make-up and mixing tanks, with all instruments and controls mounted in a centrally located control panel.

Elimination of the conventional, open roof tanks means a *clean* system, while careful integration of units ensures ease of maintenance. This compact **p-k** chiller installation, requiring only minimum insulation and floor space, *is factory assembled in the 780 gal. brine storage tank.* From here, brine is circulated throughout the building at −15°F. to −10°F., with Freon 22 used as the cooling medium.

We believe that you, like the Delta Engineering and Conditioning Co., will find it easy and profitable to work with **p-k** specialists in the design, manufacture and application of heat transfer equipment. Write for information.

the ***Patterson-Kelley Co.,*** inc.

1610 Lackawanna Avenue, East Stroudsburg, Penna.

2537

101 Park Avenue, New York 17 • Railway Exchange Building, Chicago 4 • 1700 Walnut Street, Philadelphia 3 • 96-A Huntington Avenue, Boston 16 • and other principal cities.

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PRECIPITATED CALCIUM CARBONATE U.S.P.

For Salt and Sugar—When you blend, Sturge PCC insures free-flowing salt and sugar. No caking, even when it's humid. No grit. No extra taste.

For Baking Soda—Sturge PCC prevents premature action of baking soda—even in "double-action" powders. It stabilizes but doesn't effect leavening. No discoloring. No loss of texture.

For Enriching—Fortify your flour and cereal foods with Sturge PCC . . . or add to their calcium content by just incorporating in your baking powder formula.

For Dusting—Use Sturge PCC for coating your molds, to protect the appearance of your finished product, to prevent adhesion to the wrapper.

The producer, John & E. Sturge, Ltd., of Birmingham, England, will meet your special density requirements. For a sample and further information write on your company letterhead to H. J. Baker & Bro.

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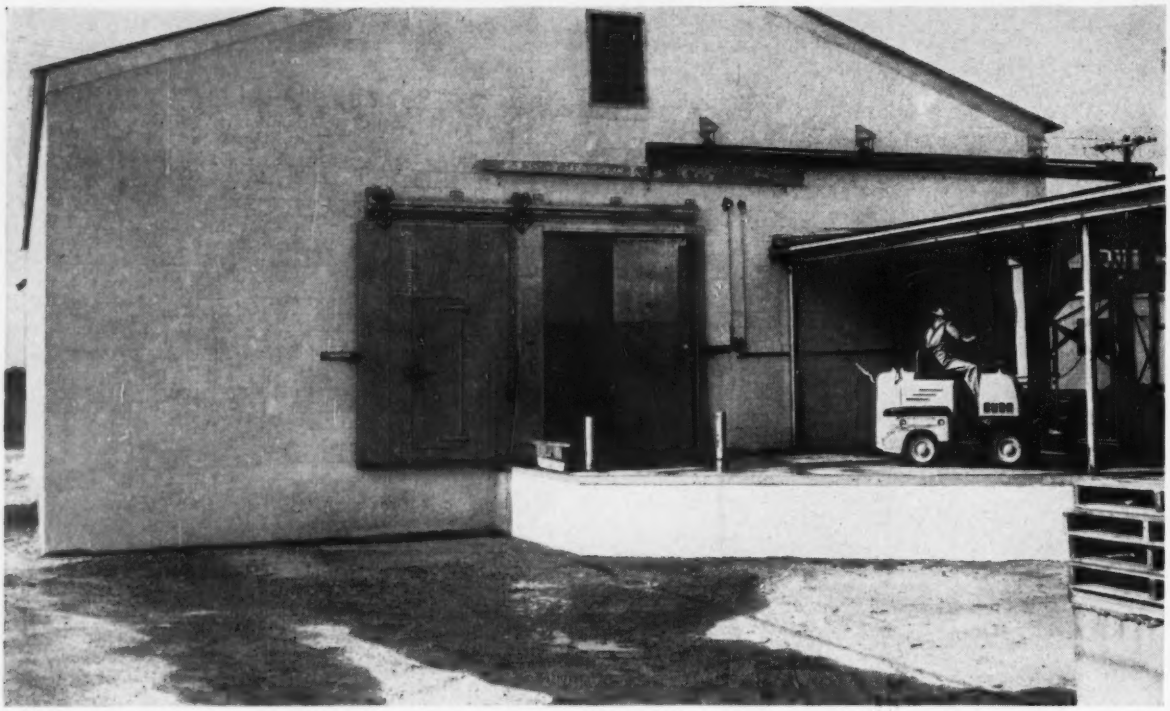


HORIZONTAL SLIDING DOOR gives a large opening in a minimum space while vestibule doors save on refrigeration. When closed, door permits employees to enter or leave through separate personnel door.

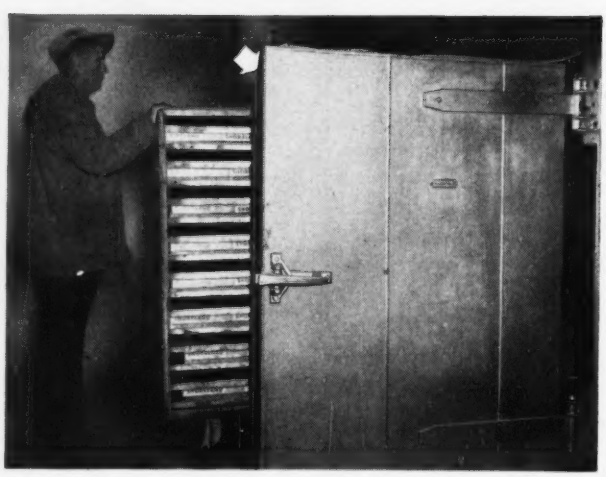
Special Jamison Doors Solve Problems at Frozen Food Plant

In processing choice quality frozen vegetables, Shoreland Freezers, Inc. of Salisbury, Md., uses two types of Jamison Doors especially designed to end icing and traffic problems.

Jamison Doors will also solve your problems. Consult your architect or write to JAMISON COLD STORAGE DOOR CO., HAGERSTOWN, MD.

JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.



NEW JAMISON FEATURE PREVENTS ICE FORMATION. The —40°F. blast freezing rooms use Jamison Double Super Freezer Doors with a new Jamison feature to prevent icing. Heater cables embedded in the frame and also in the active leaf near the astragal (see arrow) prevent ice formation at the gasket contact area. Gaskets last longer and the door opens easily.

GIVES YOU ANY RPM— AND ONLY 14¼" HIGH!

FRACTIONAL HORSEPOWER

VARIABLE SPEEDS—IN SMALLEST PACKAGE

HERE'S the new variable speed motor that cost-conscious plant operators have long sought. It's the light weight U. S. Varidrive, Type VA, compactly dimensioned to occupy least space, yet suitable for rugged industrial duty just like the larger HP Varidrive line. Compact dimensions and light weight now make built-in application of variable speeds practical. You can mount it right on your machine, close in; or in any position on floor, wall or ceiling, with or without remote control.

Quick, Accurate Dial Control

Full speed range instantly obtained in less than one turn of dial handle. The stationary dial plate is precisely calibrated for close speed setting, yet easily visible from a distance.

Gets You More Production

You can greatly increase the performance and output of your machine using fractional horsepower with Type VA. You can now get the exact speeds needed for each operation. Your operator can control the speed to a split rpm to accomplish better workmanship and to actually gain more output. This amazing motor invariably repays its low-cost investment within a few weeks.

14¼" High x 8½" Wide
Weight—87 Lbs.
Easiest Dial Control
Single and 3-Phase

U.S. VARIDRIVE MOTOR

Bulletin Chock-full of Facts

You'll want to study the internal workings of this revolutionary small horsepower motor—see how it works, note the high excellence of materials and the advanced engineering skill that makes Type VA the wonder motor. All the facts are interestingly presented in Bulletin No. 1797. Engineering details and many types shown.

U. S. ELECTRICAL MOTORS INC.
Los Angeles 54, Calif. Milford, Conn.

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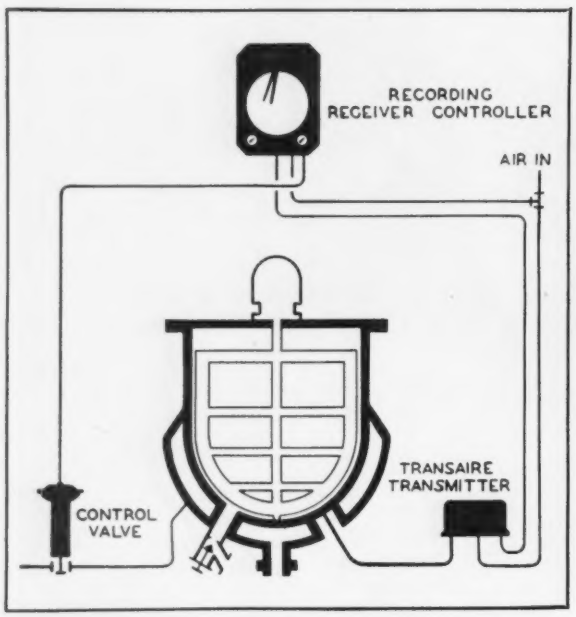
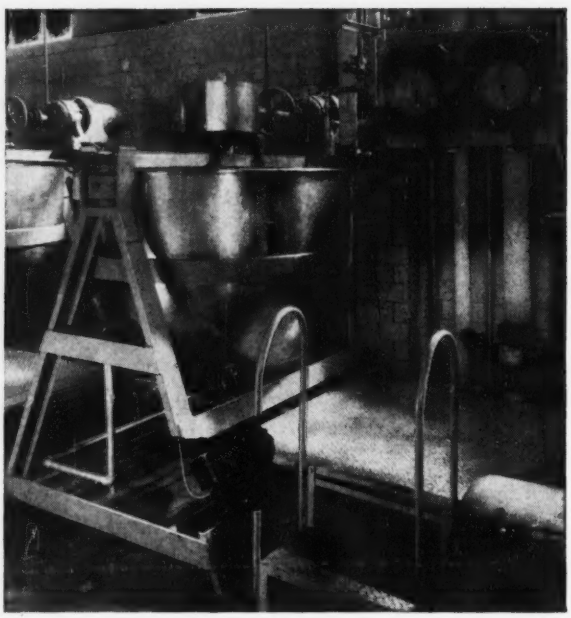
For more information, use coupon on last page.

LaRosa SAYS:

"This jacketed-kettle control *really controls*"





"We never dreamed it was possible to get such accurate temperature control in our agitated kettles", reports Mr. Vincent P. LaRosa, Vice-President of V. LaRosa & Sons, Inc. "This Taylor control system really protects our name for high quality spaghetti sauces and what's more it does it automatically and surely. It cuts our operating costs and there's no chance of human error. We like it so well we're now ordering our fifth system".

The Taylor control system that Mr. LaRosa is so enthusiastic about is without doubt the most accurate yet devised for jacketed kettles. As shown in the drawing above, the heart of this system is the Taylor TRANSAIRE* Temperature Transmitter. Here's why: **1.** The temperature-sensitive bulb of the TRANSAIRE Temperature Transmitter is flat and flush with the inside surface of the kettle—no accumulation of processed material around bulb to foul up heat transfer; no need to modify paddles to clear bulb, resulting in better quality yield. **2.** This compact super-responsive instrument, with its small, flat bulb, has an unprecedented speed of response thanks to derivative action (SPEEDACT*) in the measuring circuit. It will transmit an output pressure proportional to the measured temperature with an accuracy of plus or minus ½°F. **3.** The Fulscope Recording Receiver Controller capitalizes on this high responsiveness to give precision control. And LaRosa have a minute by minute chart record of their kettle temperatures.

There's a Taylor control system designed to cut costs and improve product quality on most every canning process. Just call your Taylor Field Engineer, or write for **Catalog 500.** Taylor Instrument Companies, Rochester, N.Y.; Toronto, Canada.

*Reg. U. S. Pat. Off.

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MEAN ACCURACY FIRST

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FOR NEW TASTE APPEAL
...SALES APPEAL
IN YOUR FINE FOODS

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"Silent Partners in Famous Foods"

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Let's face it!

HAVE YOU A DISASTER PLAN FOR YOUR PLANT?

BOMBS...OR FIRE...OR FLOOD...OR TORNADO ...you can handle them if you act now.

Let's face it... the threat of war and the atomic bomb has become a real part of our life—and will be with us for years. Fires, tornadoes and other disasters, too, can strike without warning.

Whatever the emergency is, everybody's going to want help at the same time. It may be hours before outside help reaches you. The best chance of survival for you and your workers—and the fastest way to get back into production—is to know what to do and be ready to do it. Disaster may happen TOMORROW. Take these simple precautions TODAY:

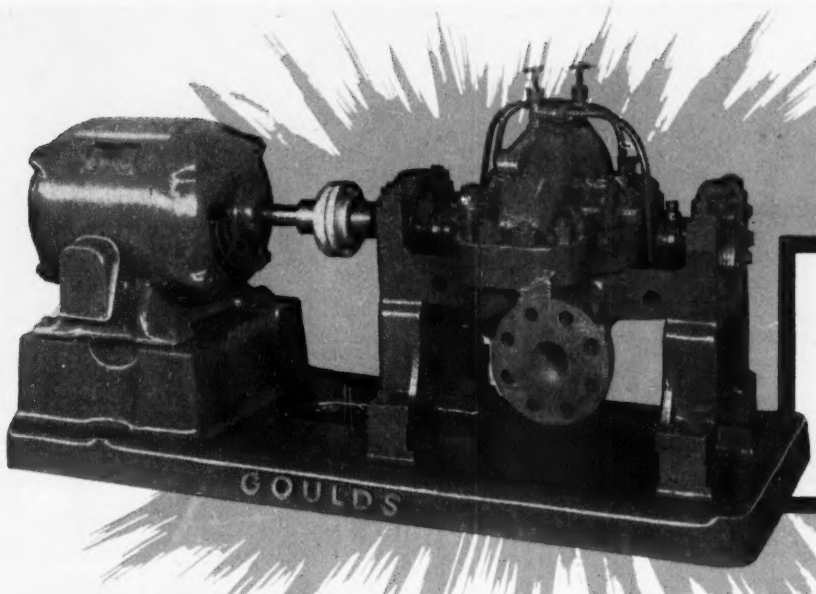
☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here, again, your CD Director can help. He'll advise you on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First-Aid Training Courses. They may save your life.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads and official CD films or literature that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good community relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . before it's too late.



announcing...

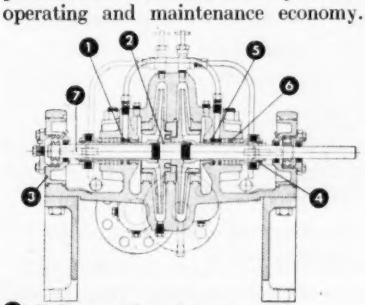
the Goulds Fig. 3305 two-stage, opposed impeller pump for clear liquids. 5 sizes. Capacities to 1200 GPM. Heads to 1000 ft.

This new Goulds pump offers you 5 specific operating and maintenance advantages . . .

To reduce your liquid-handling costs through greater standardization, easier maintenance, and improved operating characteristics, Goulds engineers have developed the *new* Goulds Fig. 3305 two-stage, opposed impeller centrifugal pump. Here are the highlights—the result of 50 years concentration on industry's centrifugal pump needs.

1 High operating efficiency, low maintenance cost

The Fig. 3305 pump combines the seven features indicated on the sectional drawing below to contribute a quality of dependable service which adds up to true operating and maintenance economy.



1. Teflon water-seal rings.
2. Stainless steel impeller key.
3. Bearing housing sealed against moisture and dirt.
4. Cowl-type glands suitable for use with quenching liquids.
5. Renewable stuffing box bushings.
6. Die-formed stuffing box packing.
7. Corrosion-resistant gland bolts.

2 Reduces your spare parts inventory

Only two shaft and rotating parts assemblies provide for 5 pump sizes and 10 pump combinations. This means a remarkable range of parts interchangeability which you will find detailed on page 7 of the descriptive bulletin. Furthermore, most of the components of the Fig. 3305 shaft and rotating assemblies are interchangeable in the Fig. 3405 single-stage, double-suction pump which has won industry-wide acceptance in the year since it was introduced.

This high degree of standardization helps materially to reduce spare parts inventories. It also gives you great flexibility in adapting your Fig. 3305 pump to changing field requirements.

3 Saves space

The short bearing span of Fig. 3305 pumps means considerable saving in floor space—as much as 50% in some comparisons with conventional designs of comparable capacity and head.

4 Stuffing box to match your requirements

You can choose either a conventional stuffing box with gland or a mechanical seal, according to your need. And you can easily change from one to the other at any time.

5 Simple to change rotation

A patented locking device makes it easy to change the rotation of this pump from right-hand to left-hand or vice versa *in the field and without additional parts.*

Before you select another pump for handling clear liquids at rates up to 1200 GPM and heads to 1000 ft., be sure you have the detailed cost-advantage story of Goulds new Fig. 3305 pump. We'll send you descriptive bulletin—promptly on request.

Get the complete story—This 12-page illustrated Bulletin No. 722.6, covers the new Goulds Fig. 3305 pump completely. It gives specifications, interchangeability tables, performance curves, dimensions.

MEMBER HYDRAULIC INSTITUTE U.S.A.

Goulds PUMPS INC.
Seneca Falls New York

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA • PITTSBURGH • TULSA

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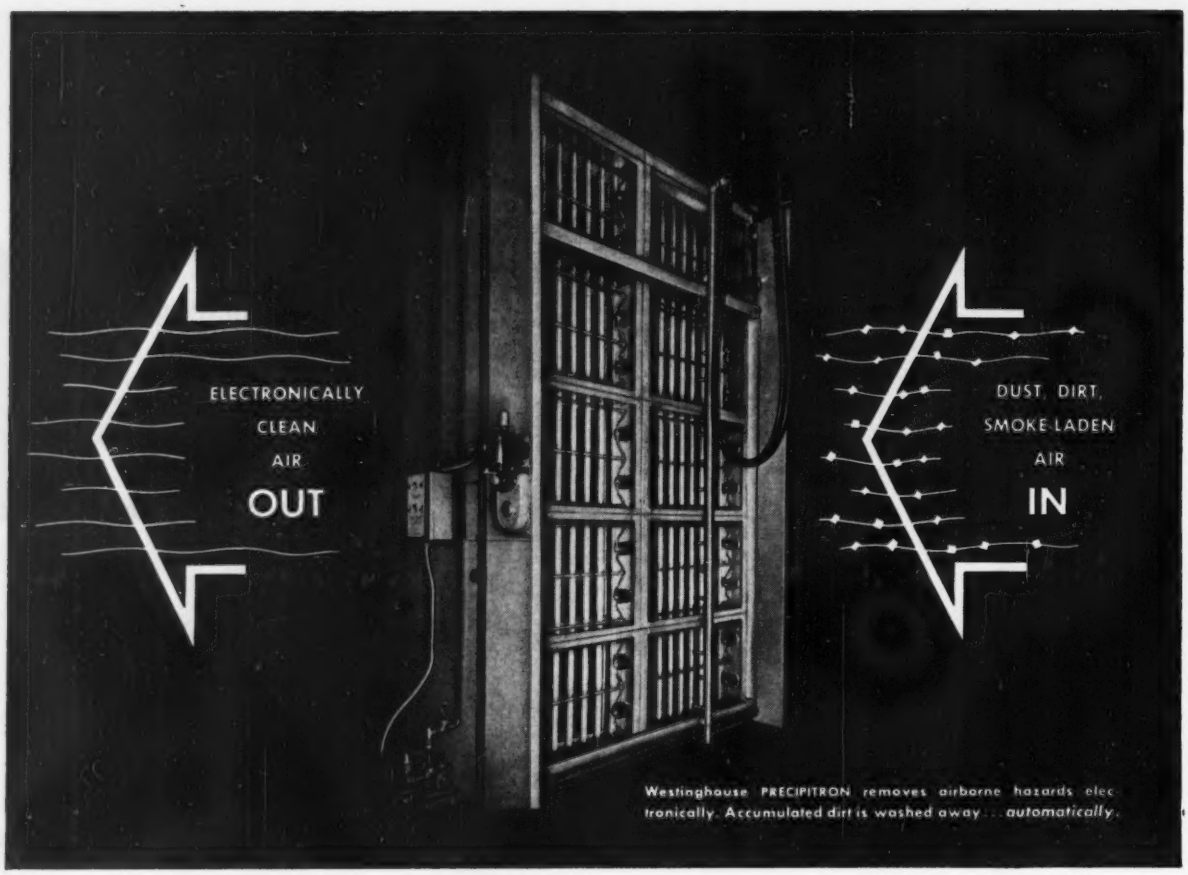


Westinghouse PRECIPITRON® Removes 90% of All Airborne Food-Contaminating Particles

Food processing areas must be sanitary . . . free of airborne dust particles . . . minute dust particles that are known carriers of bacteria, which cause rancidity, molding, and costly food spoilage.

Now Westinghouse PRECIPITRON delivers cleaner air than ever before thought possible . . . permits the setting of new standards in food processing sanitation. This means peak output with minimum spoilage . . . dollars and cents savings on cleaning and housekeeping of processing equipment . . . higher employee efficiency because of healthier atmosphere.

Westinghouse PRECIPITRON cleans air electrostatically—charging incoming airborne particles—then trapping them on collector plates. Even microscopic particles cannot escape this highly efficient method of air cleaning. Accumulated dirt is washed away automatically by push-button operation.

Check your requirements for Electronic Air Cleaning for individual areas, or possibly your entire plant. To learn more about the many advantages of the Westinghouse PRECIPITRON, call your nearest Westinghouse Sturtevant Office, or write: Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

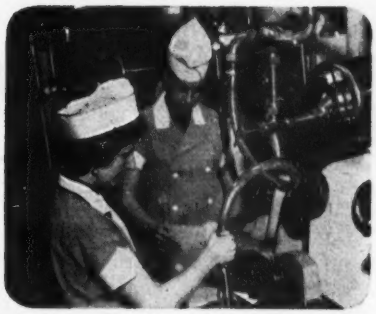
WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE...IF IT'S Westinghouse

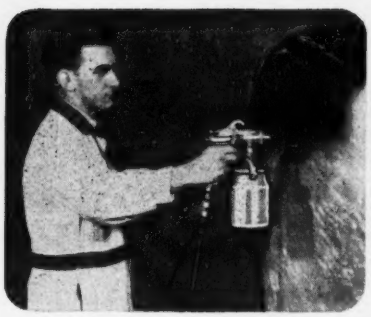
J-80425

Here are five ways to use versatile-flexible

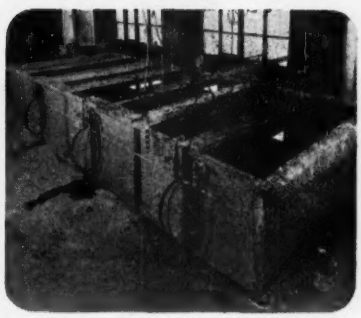
TYGON PLASTICS



AS TUBING OR HOSE to pipe taste-sensitive liquid foods or corrosive chemicals. Tygon Tubing is glass-clear, flexible as a piece of string, resistant to acids and alkalies, non-toxic, sterilizable, and is made in bores from 1/16" to 2".

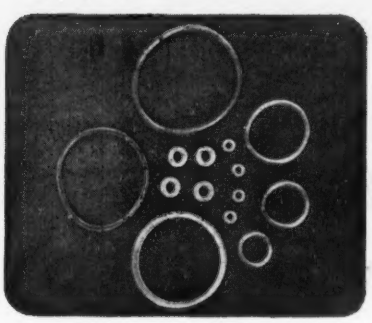


AS A PAINT to protect plant and equipment from attack by corrosive fumes and gases. Applied by brush or spray, Tygon air dries quickly to form a tough impermeable plastic skin that shrugs off acids, alkalies, oils, water and alcohols.



AS A HEAVY-DUTY LINING to protect the interior of pickling, plating, chemical processing and storage tanks from destruction by corrosive solutions. Easier to install than rubber linings, Tygon can be applied to tanks of any size or shape.

AS A CORROSION-RESISTANT GASKETING. Tygon shows no chemical deterioration with age. Gaskets remain flexible and tight, unaffected by weather or exposure to chemicals. Tygon gaskets are available in an almost unlimited size range.



AS MOLDED ITEMS. Tygon's toughness, durability and flexibility, coupled with staunch chemical resistance, offer pronounced performance characteristics for grommets, washers and molded mechanical goods items in virtually any shape.

Tygon is but one of a number of specialized materials manufactured and fabricated by The United States Stoneware Company or its affiliated divisions. Other products include: chemical ceramics, in stoneware or porcelain; sintered metallic oxides; natural, neoprene, silicone or other synthetic rubbers; acid brick and cements; adhesives and organic bonding agents, and specialized processing equipment.

WRITE TODAY for the TYGON PORTFOLIO. *Pertinent data and technical characteristics of the various Tygon compounds to enable you to determine just how you can use Tygon most advantageously. Free, on request. Address Dept.* FE1154.

U. S. STONEWARE

PLASTICS and SYNTHETICS DIVISION

Akron 9, Ohio

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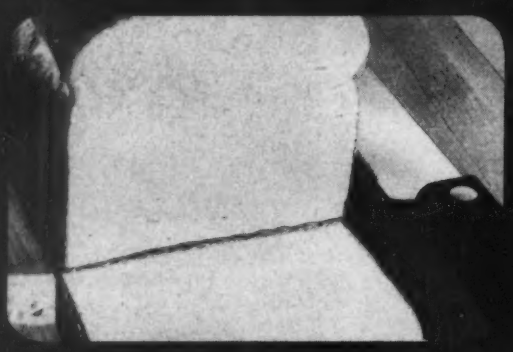
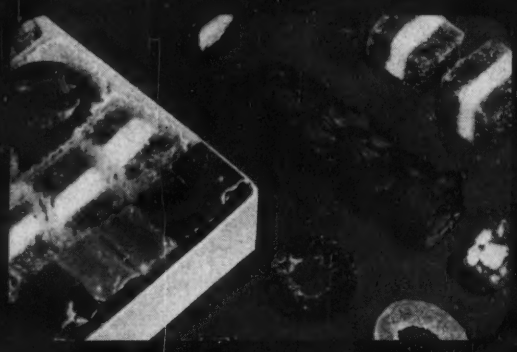
497-D

For more information, use coupon on last page.

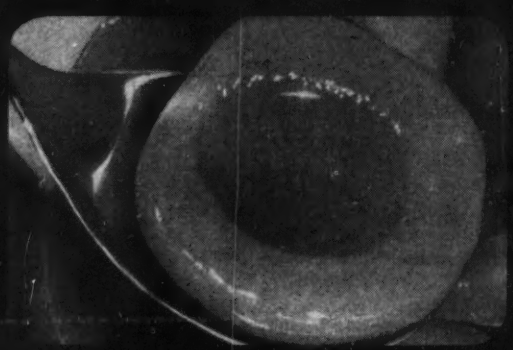


Cerelose saves the baker time and money . . . Compressibility tests show Cerelose-baked bread stays softer longer and is unsurpassed in scoring for texture, volume, grain, thinness of crust and color.



In candy, Cerelose exerts good grain control, produces mixes that deposit better in the mogul, and contributes to a longer shelf life.

Cerelose is indispensable in the manufacture of ice cream, sherbets and ices because it controls crystal formation, yielding smooth, uniform textures which promote true flavors and a longer shelf life.



Cerelose is a pure, clean natural sugar that brings out the true color and flavor of processed foods without developing excessive sweetness.

Experience specifies CERELOSE

To achieve greater efficiency *and* superior quality is the problem these days. Cerelose® brand dextrose, manufactured under rigid controls, helps the food industry develop top-quality products because of its uniformity, purity and adaptability. You can be certain of its performance at all times. Cerelose is always available in quantities to suit your needs.

Ask our technical service department for the latest information on the use of Cerelose brand dextrose in your particular industry.

CORN PRODUCTS REFINING COMPANY · **17 Battery Place, New York 4, N. Y.**

WORLD'S STRONGEST TAPE?

Even "The Angel" can't break it!

"Scotch" Brand Filament Tape is super-strong, amazingly shock-resistant. Thousands of filaments imbedded in the pressure-sensitive adhesive give it up to 500 lbs. tensile strength per inch of tape width. New exclusive "mirror surface" adhesive gives 100% tape contact; *puts all the tape strength to work.* For complete information on how you can use it in materials-handling and heavy-duty packaging, just write on your letterhead to Dept. FE-114.

FILAMENT TAPE... one of **300** PRESSURE-SENSITIVE TAPES for industry, trademarked...

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SCOTCH BRAND

The term "Scotch" and the plaid design are registered trademarks of Minnesota Mining and Mfg. Co., St. Paul 6, Minn. General Export: 122 E. 42nd St., New York 17, N.Y. In Canada: London, Ontario, Canada.

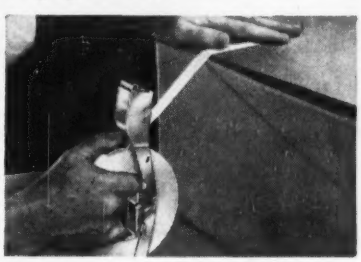
3M COMPANY

LOOK what you can do with it!

PACKAGE PRODUCTS in quick-opening Tear Strip Containers made with "Scotch" Brand Filament Tape. Just a pull of the tape and the top is off—no knives, cleavers, or wedges needed; ends profit-loss on damaged goods!

PALLETIZE merchandise for storage or shipment. Filament tape holds packages securely; can't cut workmen's hands; won't cut or damage packages; presents no disposal problem.

UNITIZE shipments of bagged goods with "Scotch" Brand Filament Tape. A quick, inexpensive way to reduce damage claims due to load shifting, bulging, vibration.



SPEED APPLICATION with new "Scotch" Brand Filament Tape Dispenser Model H-120. Complete, portable, and compact; saves time and makes application easier.

at Johnston, quality control starts with the president

The Robert A. Johnston Company, famous makers of candies, cookies, ice cream toppings and coatings, take every precaution to maintain the fine quality and flavor of their products.

Even the President, Mr. Edward Johnston, puts aside his administrative duties to personally make sure that Johnston's famous quality never changes. As a member of the company's testing panel, he tastes and passes on new batches of all products.

Such concern with quality control naturally follows through to the shipping of their products. For twenty-five years, Johnston has been using Inland Steel Containers to keep the color, flavor and quality of their ice cream toppings and coatings up to their high standards during shipment.

Inland is constantly developing new ways of "protection-eering" steel containers to preserve the quality of an ever-increasing variety of products during shipment. If your package isn't delivering the quality you ship, write today for full information on Inland protection-eered containers.

It's better to ship in steel.

INLAND

Food Division, Department A

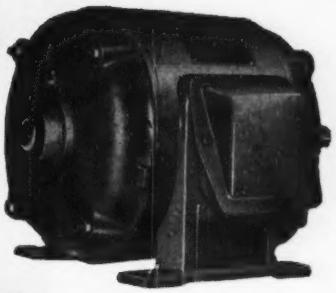
INLAND STEEL CONTAINER COMPANY

Division of Inland Steel Company

6532 South Menard Avenue • Chicago 38, Illinois

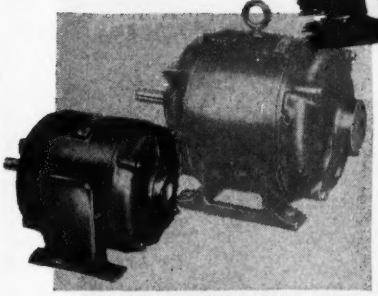
Plants: Chicago • Jersey City • New Orleans

NEW Century Performance-Rated® INTEGRAL H.P. MOTORS



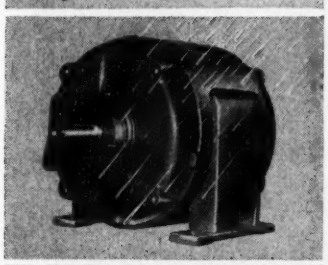
Now available in 1 . . . 1½ . . . 2 H.P. sizes— NEMA frames 182 and 184.

Improved Motors to match your needs



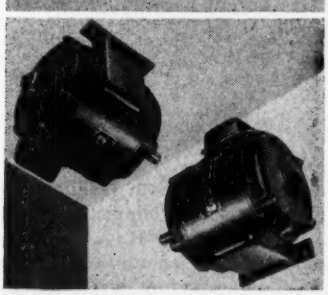
SMALLER — LIGHTER

More uniform silicon-laminated steel; thinner, *tougher* "Mylar" slot insulation — just two of the many technical developments that help make these new Century Performance Rated Motors so much *smaller* and *lighter*.



BETTER PROTECTION

New concepts of internal motor ventilation permit end bracket and frame design that gives far better protection from falling liquids and solids . . . still maintain 40°C. temperature rise.



MORE FLEXIBLE MOUNTING

You can even have cushion mounting with these new Century Integral H.P. Motors — your choice of sleeve or ball bearings. Ball bearing motors mount vertically, upside down, in any position. End brackets can be rotated for floor, ceiling or side wall mounting.

EVEN MORE DEPENDABILITY

Improved plastic impregnating varnish and plastic insulated magnet wire provide unusual resistance to abrasion, moisture and heat. These new materials possess far better dielectric qualities. Die cast aluminum rotors are individually, dynamically balanced to assure freedom from vibration.

Century C MOTORS

Specify CENTURY Performance Rated motors for your equipment. Call a Century District Sales Office or your nearest Century Authorized Distributor.

Offices and Stock Points in Principal Cities

CENTURY ELECTRIC COMPANY • 1806 Pine Street • St. Louis 3, Missouri

For more information, use coupon on last page.

PROVIDES SPEED AND AUTOMATIC QUALITY CONTROL

...for the MURRAY COMPANY (Division of H. A. Johnson Co.)

PROBLEM:

High labor charges and uncertain accuracies in loading sugar to syrup kettles presented a challenge to the cost- and quality-conscious management of the H. A. Johnson Co.

SOLUTION:

A suitable conveyor system feeding a Richardson Automatic Scale provided high volume, controlled accurate flow of sugar to the cookers. Another alert management had reduced their labor charge to practically nil and incorporated machine-made, repetitive accuracy into their process.

Rising labor costs *can* be offset while still maintaining both quality and quantity production. Proof of this is the Richardson installation pictured, recently completed for the Murray Company, Division of the H. A. Johnson Co., Boston, Mass. Adopting the recommendations of a Richardson field engineer, this well known manufacturer of soda fountain syrups and toppings has actually increased output at reduced unit cost. At the same time product quality is now rigidly controlled, *automatically*.

Materials handling by weight has been a Richardson specialty for more than fifty years. And every year has seen more practical applications throughout the processing industries of this wide range of experience.

At no obligation to you, a Richardson engineer will gladly call, survey your present methods, and show you the Richardson way to lower costs through efficient materials handling by weight.

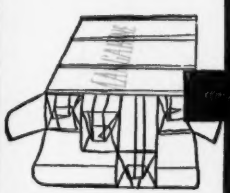
Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902

Richardson Scale Co., Clifton, New Jersey. Automatic Weigher Systems of All Types: Automatic Bulk Weighing Hopper Scales, Including Conveyor-Feed Types • Continuous Feeder-Weighers • Automatic Bagging Scales • Bag Sewing Conveyors Packers • Multi-Material Proportioning • Process Control Panels. *Branch offices in:* Atlanta • Boston • Buffalo • Chicago • Detroit Houston • Minneapolis • New York • Omaha • Philadelphia Pittsburgh • San Francisco • Wichita • Montreal • Toronto.

Monsanto Sodium Benzoate

3 places to use it profitably



Margarine

Concentrations of 0.10% of Monsanto sodium benzoate are used to reduce the risk of rancidity and darkening during shipment or in high-temperature areas. Vitamin content of the margarine is not affected.

Jams, Jellies, Preserves

Sodium benzoate improves their "keeping qualities," makes them last longer.

Beverages . . . Fountain Syrups . . . Fruit Juices

Use sodium benzoate at 0.1% for most of these products. Added immediately to the juice or pulp as it comes from the press, sodium benzoate helps control harmful fermentation without affecting odor or taste. Average concentration needed is 0.10%.

MONSANTO

SERVING INDUSTRY... WHICH SERVES MANKIND

Organic Chemicals Division,
MONSANTO CHEMICAL COMPANY,
Box 478, St. Louis 1, Missouri

Please send me your booklet on Sodium Benzoate.

Name.....

Address.....

City..... *State*.....

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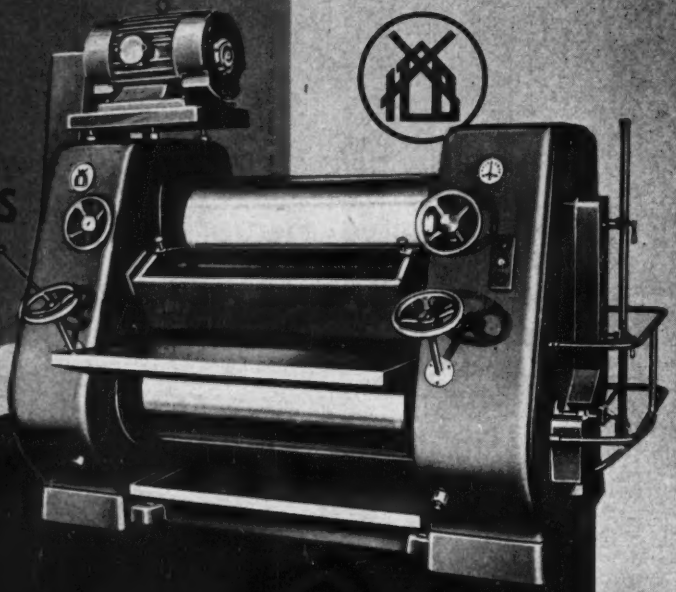
A Scraper Blade That Never Needs Sharpening!



ON THE

Bauermeister

3-ROLL REFINER

(TYPE D.W. 51)

You won't find anywhere a medium-sized refiner which will give you the volume production of fine-grained finished paste that you get from the Bauermeister D.W. 51. It carries chocolate or other paste all the way from first to final refining, in only two passes. It operates at extremely low cost, requires little attention – the scraper blade is only one of several trouble-free features – and gives years of faithful service. Write today for catalog giving full information.

DELIVERY SCRAPER KNIFE (patented) allows the scraper to be used up completely without sharpening or adjustment.

ACCURATELY GROUND ROLLS of uniform hardness; plus efficient water cooling, insures perfect transfer of the paste from roll to roll, results in better crushing and refining.

ROLL ADJUSTMENT of each pair of rolls independent of the other. Adjusting hand-wheels easily accessible in front of the machine.

GEARS: Oil-bath immersed, machine cut helical type, for smooth, vibrationless, quiet operation.

ROLL DIMENSIONS: Dia 15¾", working length 30".

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Coffee—Soluble
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Spice Compounds

Kard-O-Pak Pliofilm or Polyethylene-lined bags by AMERICAN will give you efficient packaging performance from point of packing to point of sale. Here is simplified packing with sealed-in protection against air, moisture, liquids, grease, or oil. Kard-O-Pak is a stand-out food seller with its self-opening stand-up base that stacks so neatly on the shelf, that assures dimensional stability with sales-winning showmanship. Kard-O-Pak bags by AMERICAN will give your food products sealed-in Vacuum Freshness at a considerable saving over conventional rigid containers. Now used on Gump, Consolidated, Fry, Benco and other equipment. Write today for the complete Kard-O-Pak story.

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Here is the plant of the Natural Gas Storage Company of Illinois, Herscher, Ill. "Century" Asbestos-Cement Corrugated is used for the roofing and siding.

"Century" Corrugated is made of two permanent, highly fire-resistant materials —asbestos fiber and portland cement— compressed under tremendous hydraulic pressure to make strong, tough sheets for almost every roofing or siding requirement.

It can't burn, rot or corrode. What's more, it resists weather, vermin and insects. There's rarely a need for maintenance and it never needs protective paint. "Century" Corrugated Asbestos is low in first cost and low in application cost . . . easily sawed, drilled and fitted on the job.

Be sure to write us for information about particular applications. We'll rush a reply with complete details.

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Nature made asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

K&M Best in asbestos ®

Here's another reason why

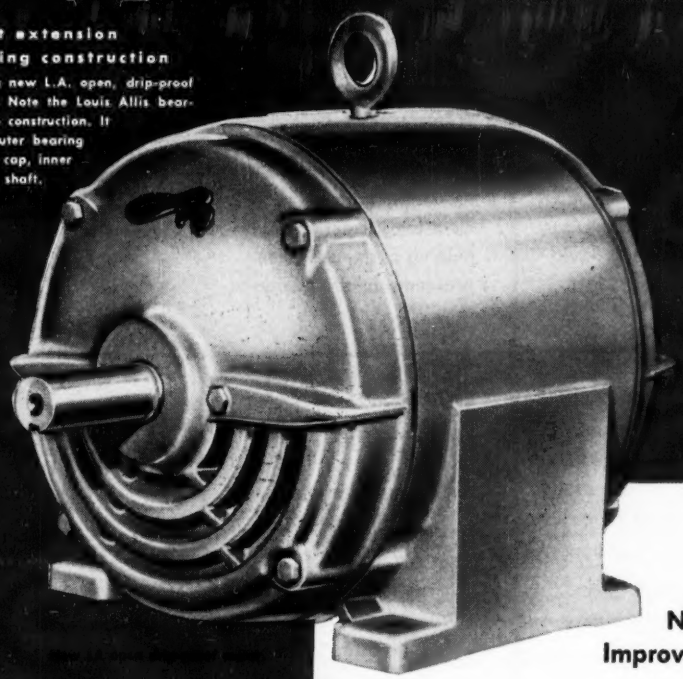
the NEW L.A. *Line*

by the Louis Allis Co.

is your BEST *electric motor* BUY

Shaft extension bearing construction

used in new L.A. open, drip-proof motors. Note the Louis Allis bearing-cap construction. It locks outer bearing race to cap, inner race to shaft.



with NEW BEARING CONSTRUCTION

plus

New modern styling
More compact design
New conduit box arrangement
Improved ventilation and better protection
More versatile mounting

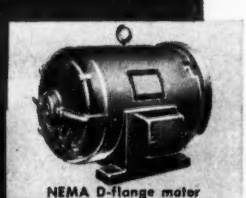
HERE'S the locked bearing construction that makes the new L.A. motors even better—gives them extra life, extra dependability. It positions the rotor . . . limits shaft end-play . . . gives you ample V-belt drive capacity. You get factory prelubrication, too, with a new, improved grease-retaining system that saves servicing and maintenance — for years of attention-free operation under most conditions.

That's not all! You get standard bearings in every unit — sizes specially selected to be easily obtainable from local stocks. And there's no need to tear the motor down to get bearing numbers — they're stamped right on the new motor nameplate.

Add this modern, dependable bearing construction to all the other features and you see why the L.A. line is your best motor buy. Get the complete story from your nearby Louis Allis Sales Engineer.

We specialize in SPECIAL MOTORS *and* PROMPT DELIVERY, TOO

Vertical NEMA C-flange motor



NEMA D-flange motor

NEMA C-flange motor

THE LOUIS ALLIS CO.

MILWAUKEE 7, WISCONSIN

LA-105

These Flo-Sweet services cut your sugar costs

"Talk about service—we even help you plan ahead!" exclaims your Flo-Sweet Engineer. "That's why, when you use Flo-Sweet, you get greater satisfaction at every step. From the time you first consider liquid sugar, during equipment layout and installation, up through carefully timed deliveries—the Flo-Sweet technical staff is at your service. Here are six important ways they can help you save."

FORMULA CONVERSION

Flo-Sweet specialists readily convert your present dry sugar formulas to liquid.

RESEARCH

Flo-Sweet laboratory technicians have long experience in helping customers solve problems involving sugar.

SUGAR SYSTEM LAYOUT

Flo-Sweet engineers' quarter century's experience with liquid sugar systems saves you time and expense.

STORAGE

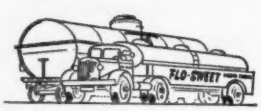
Flo-Sweet's huge storage facilities free you from carrying costly sugar inventories.

SPECIAL EQUIPMENT

Design and installation of special sugar handling and processing equipment are routine procedures for Flo-Sweet engineers.

DELIVERIES

Flo-Sweet has set the pace for the industry in prompt liquid sugar deliveries.



There's excitement and drama in the history of liquid sugar! Get the inside story in "Pursuit of an Idea"—write for your free copy today.

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FIRST IN LIQUID SUGAR

Distributed from Yonkers • Pittsburgh • Toledo • Detroit

REFINED SYRUPS & SUGARS, Inc.

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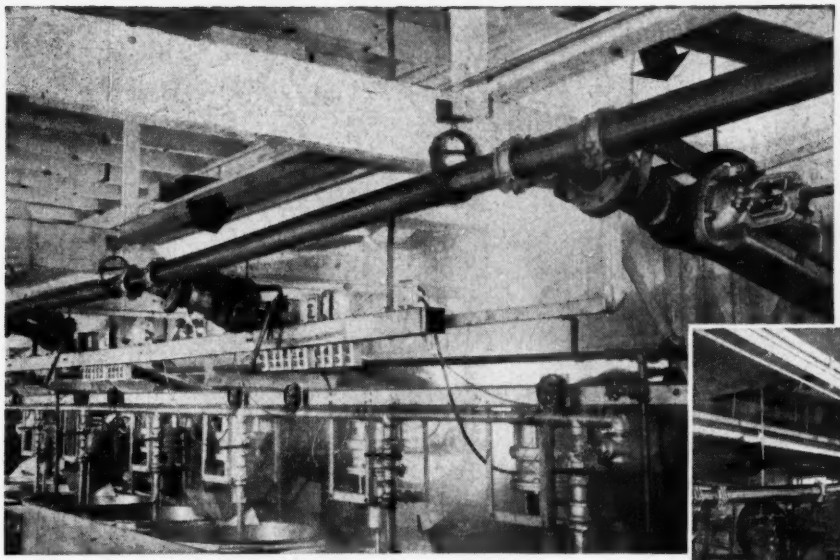
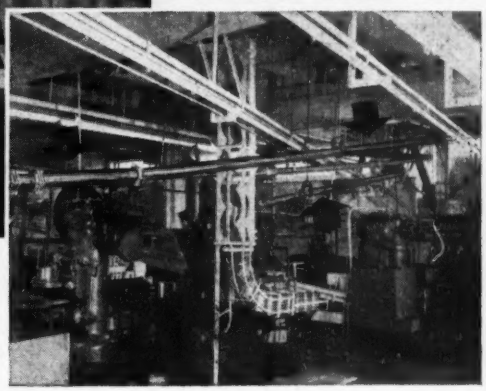
SERVING INDUSTRIAL SUGAR USERS EXCLUSIVELY



Above—Whole berries move from storage to processing in 4" PYREX brand glass pipelines. The plumbing and hanging of these rugged lines is simple and requires no special training or care.

Outdoors, PYREX brand glass pipe is unaffected by even the severest changes in weather. Its expansion is only 5/8" per 100' compared with steel's 2¾" per 100' under similar temperature-change conditions.



Right—Sauce and purée travel from kettles to filling in 2" and 3" PYREX brand glass lines. Their sparkling transparency is an operating advantage—operators can see when material is there.

PYREX® pipe dresses up canning plant and makes important savings

Invariably visitors at National Cranberry Association's Hanson, Massachusetts canning plant admire the sparkling clean PYREX brand pipelines sluicing whole berries from storage to processing and transferring sauce and purée to the packaging equipment.

But production economy is the *main* reason National Cranberry continues to add PYREX lines to their materials handling system.

Foods traveling in glass can't pick up even the slightest traces of foreign taste, color, or odor—can not be contaminated. And PYREX brand glass pipe is impervious to food-acid corrosion.

Other savings with PYREX pipelines

You save on installation. Even pipe fitters working with glass for the first time report it easy to handle.

You save on replacement. Glass does not rust out. Food processors who have used PYREX brand pipe for years say that breakage is no problem.

And PYREX pipe is easy to clean. You can *see* when it needs cleaning. You can see when it's clean.

You'll find PYREX pipe the lowest cost corrosion-resisting, non-contaminating pipe you can use.

There's an illustrated booklet that will tell you more about the experience of wineries, dairies, fruit and syrup processors, and other food companies who consider PYREX brand pipe vital to their operations. We'd like to send you a copy.

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CORNING, NEW YORK
Corning means research in Glass

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Please send me a copy of Bulletin EA-1—"PYREX Pipe in the Process Industries." Also, if I have checked here ☐, send me your Installation Manual for PYREX Pipe which, I understand, shows how simple it is to handle.

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Address .....

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40

reasons why
any service requiring
BRONZE GATES
can be planned for
lasting economy

Look over the list of 40 patterns in Jenkins' complete line of Bronze Gates. You'll find the valve you need in this new folder, with details of the *extra value* design and construction that makes Jenkins the best buy for any service. Get this folder, use it to plan your hookups for lasting valve economy.

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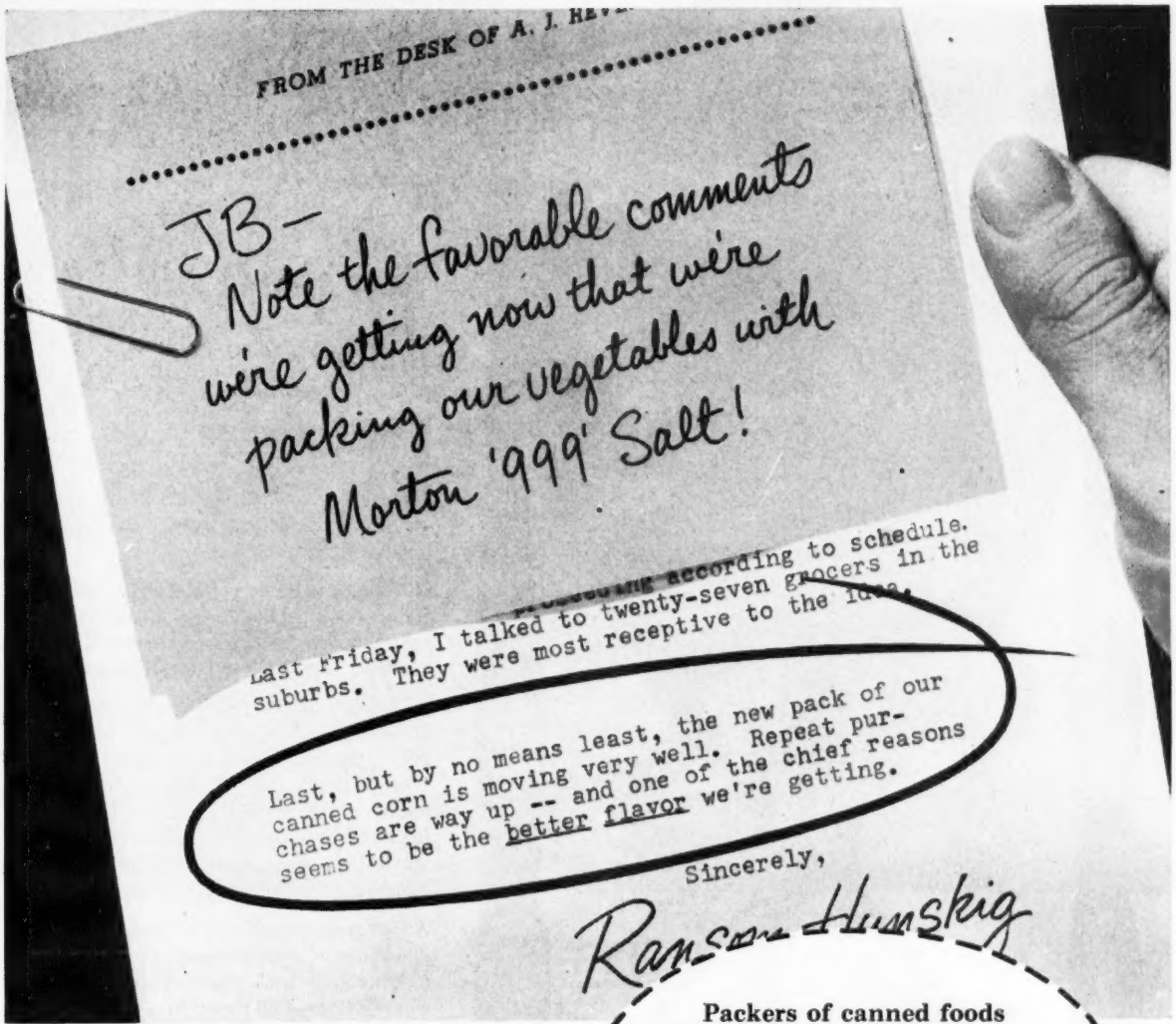

FROM THE DESK OF A. J. RE
JB—
Note the favorable comments we're getting now that we're packing our vegetables with Morton '999' Salt!
Last Friday, I talked to twenty-seven grocers in the suburbs. They were most receptive to the idea.
Last, but by no means least, the new pack of our canned corn is moving very well. Repeat purchases are way up -- and one of the chief reasons seems to be the better flavor we're getting.
Sincerely,
Ransom Hunskig

Packers of canned foods need Morton '999' Salt to make sure of good flavor and prevent quality variations. So do makers and processors of candy . . . beer . . . cereals . . . seasonings . . . meat . . . malted milk . . . mayonnaise . . . margarine . . . sauerkraut . . . olives.

MORTON '999' SALT insures uniform quality in processed foods for two reasons. It's guaranteed to contain more than 99.9% pure sodium chloride—*always!* The 0.1% (or less) is a neutral inert sodium salt—never bitter calcium or magnesium compounds.

Vacuum pan evaporation assures that this salt will be clean . . . free-flowing . . . evenly soluble. It has a constant weight per volume ratio . . . won't pack down.

For further details, mail coupon today!

NOTE TO ALL CANNERS: Morton can also provide **BULK SALTING MACHINES** and **SALT TABLET DEPOSITERS** which enable you to get the correct amount of salt into every can... time-saving and labor-saving **BRINE-MAKERS** which deliver saturated, high-purity brine anywhere in your plant. Get the full details on these, too!

MORTON '999'

THE SALT THAT CARRIES ITS OWN GUARANTEE

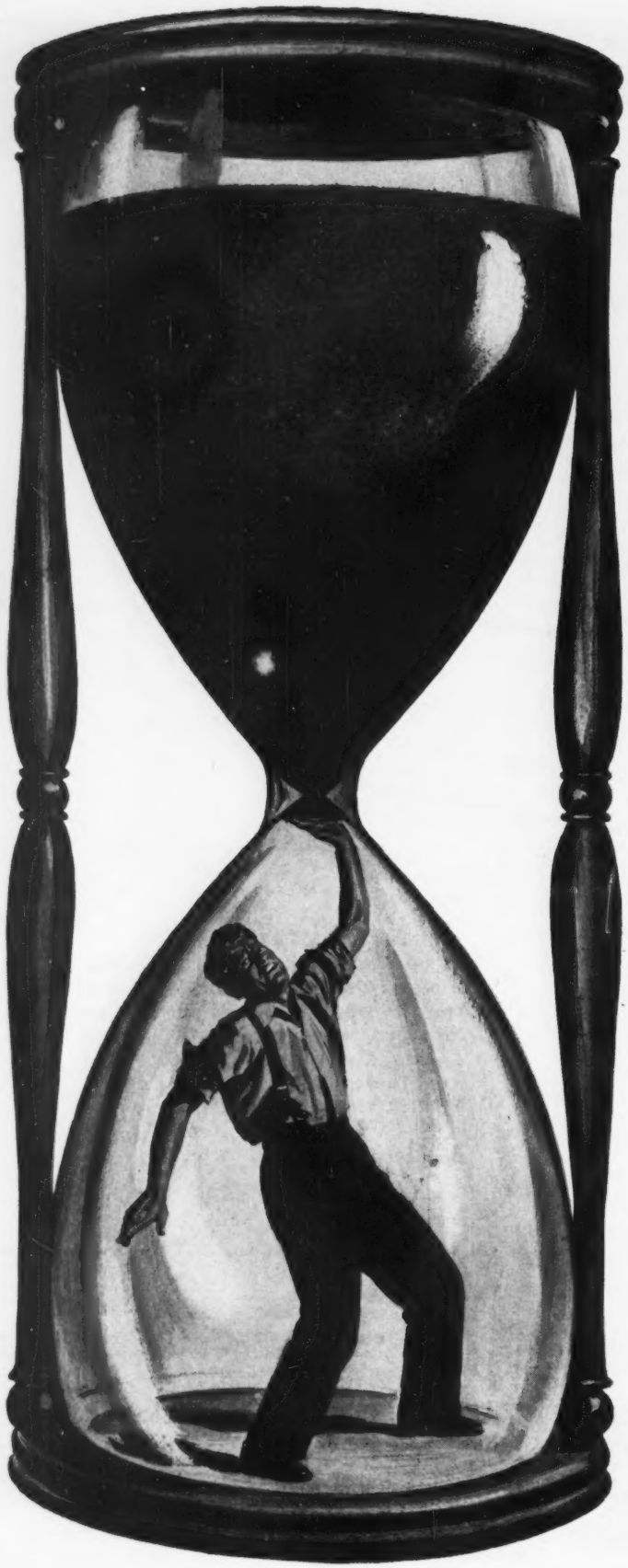
MORTON SALT COMPANY
Industrial Division Dept. VE-11
120 So. La Salle Street, Chicago 3, Illinois

☐ **Without obligation, please have a representative call with information on Morton '999' Salt and methods of using it in my product.**

Please send me more information on the
☐ **Bulk Salter** ☐ **Salt Tablet Depositer** ☐ **Brinemaker.**

Name_____
Title_____
Company_____
Address_____
City_____ Zone____ State_____

For more information, use coupon on last page.



Time stands still inside your package . . .

Does every tick of the clock rob your product of a fractional share of its original goodness?

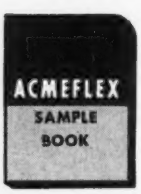
If your product is painstakingly perfect the day you pack and ship it, will oxidation, moisture or light steal some of that goodness before it reaches the consumer?

Such loss need not occur . . . not in this age of scientific packaging. Today's packaging engineer has dozens of flexible materials to choose from. Each has its own unique protective characteristics. By combining several layers of these materials into a single sheet, Acmeflex allows you to handpick the protective qualities you need.

Acmeflex is available in an almost unlimited range of combinations . . . transparent films, metallic foils, plastic-coated papers, combinations of all three! You specify the protective and visual goals of your packaging, we do the rest. Acmeflex can be printed to your specifications and is delivered on webs for high speed packaging equipment.

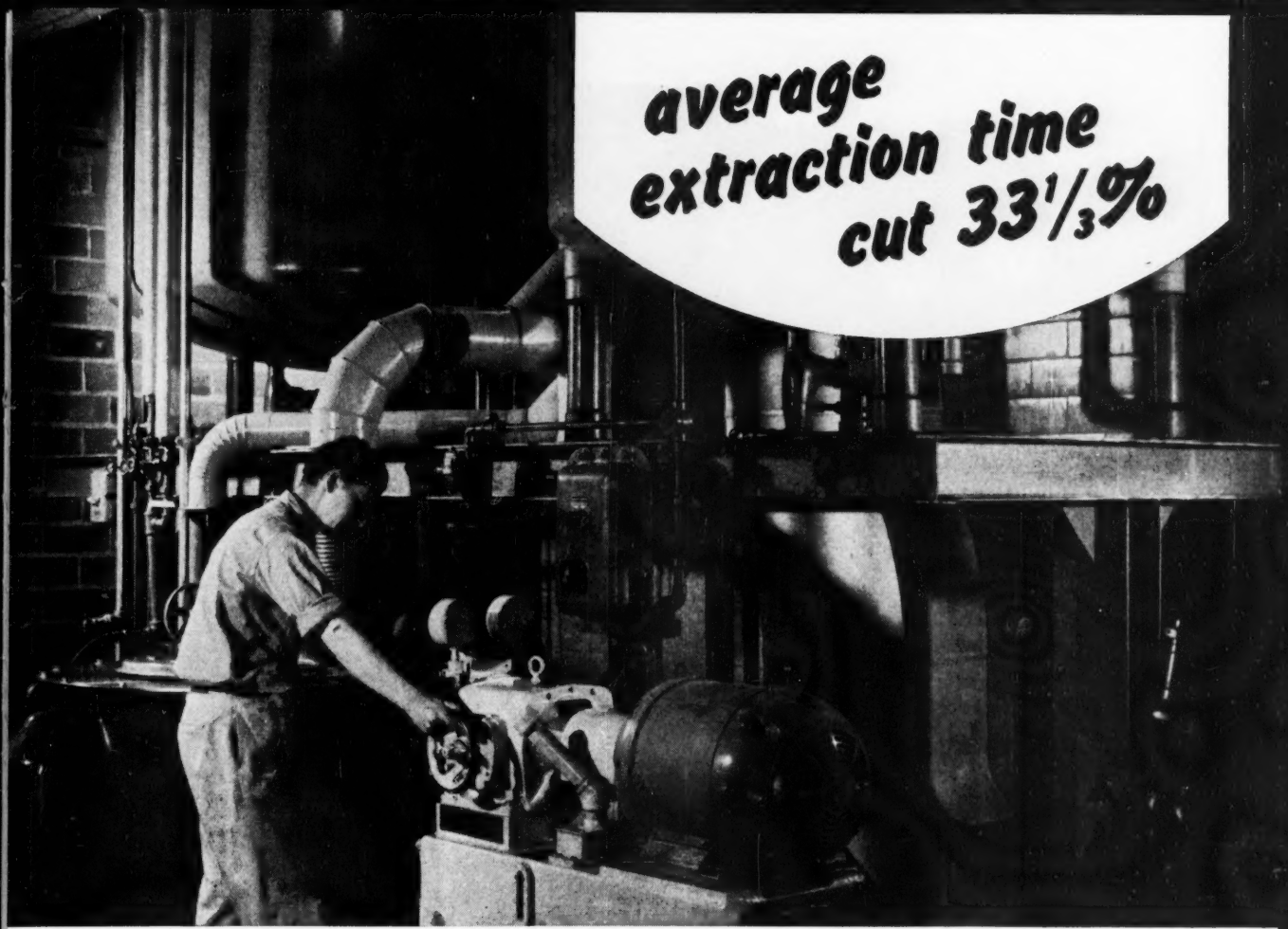
ACMEFLEX

The barrier packaging that defies the elements.



SEND FOR THE ACMEFLEX CATALOGUE today. It contains samples of typical Acmeflex combinations together with their protective specifications.

ACME BACKING CORPORATION
Meadow and Bogart Streets, Brooklyn 6, N. Y.



Once more the ANY-SPEED Oilgear Drive betters machine performance "painlessly"

Many times in our experience the performance of an already highly efficient machine has been bettered without redesign, solely by changing the drive. One case out of many *varied* cases, is the Tolhurst Centrifugal pictured above, located in a great pharmaceutical house. This centrifugal was originally equipped with a two-speed electric motor drive. However the chemicals it is called upon to handle have widely varying crystal packing characteristics. Some of these crystals packed so densely at the speed available, extraction was inhibited, extraction time far out of balance and crystal removal difficult.

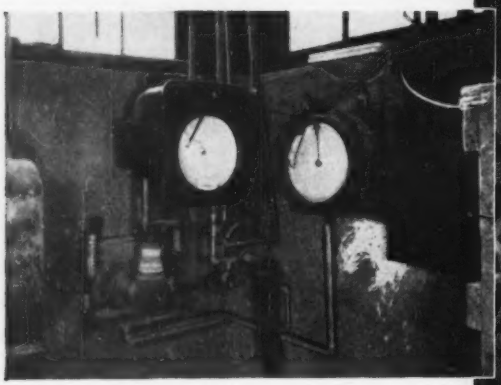
A change was made to an *"ANY-SPEED"* Oilgear Fluid Power Drive. Now the operator is able to shade the speed of the centrifuge experimentally—*and easily discover* the *best* speed for each batch of crystals.

As a result, extracting that used to take from 6 to 9 hours was cut to 4 to 6 hours. The extremely slow speed also available made unloading a great deal easier. This user now has several other Oilgear drives including one on a laboratory centrifuge.

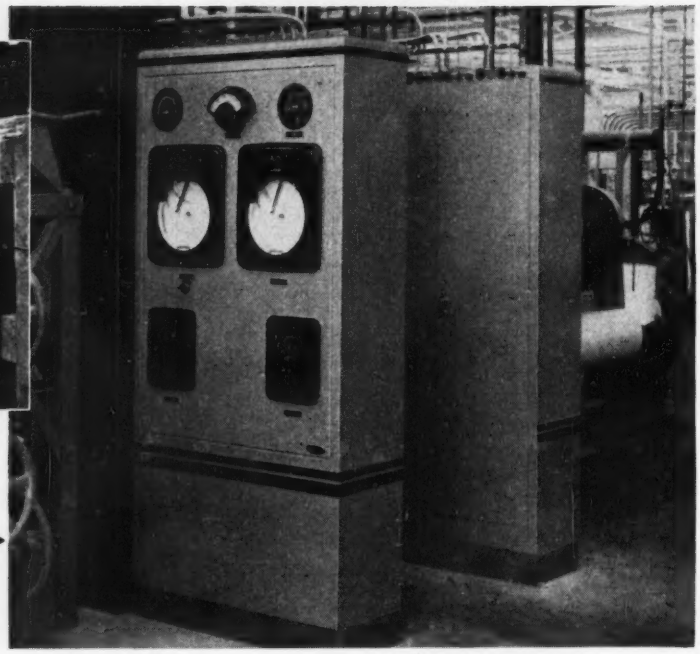
There is very often a direct efficiency coefficient between machine operating speed and the type of work being handled. And we can cite many widely varying instances where equally dramatic and profitable gains resulted at once from a simple change to *"ANY-SPEED"* Oilgear Fluid Power Drives. If you want some interesting factual data on Oilgear's steplessly variable speed drives, their outstanding responsiveness to control impulses, their smooth acceleration and deceleration, talk to an Oilgear Engineering Representative. His mature and sound engineering recommendations may profit you greatly. THE OILGEAR COMPANY, 1580 W. Pierce St., Milwaukee 4, Wisconsin.

OILGEAR

OILGEAR



This is part of an old-fashioned installation which lacks the convenience and efficiency of modern instrumentation.

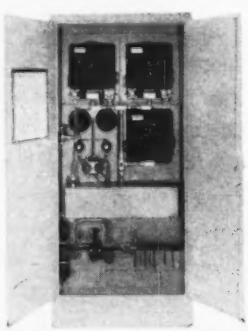


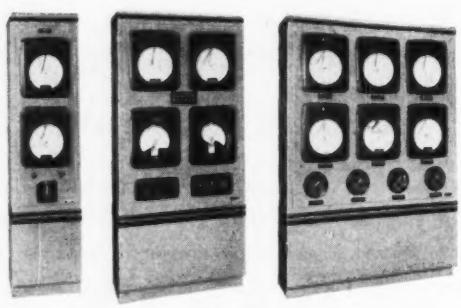
Compare this centralized Foxboro Cabinet installation of similar instrumentation, which saves time for the operator, makes his work more efficient, and gives maximum protection to the precision instruments required for his process.

See what a difference FOXBORO cabinet-mounting can make!

These photos show at a glance how much more efficient and attractive your instrument installation can be if it's integrated and centralized in a Foxboro Cabinet. Not only are the instruments protected from dust and process "atmospheres", but they're conveniently grouped together for more efficient use and easier maintenance. Those "endless steps" of the operator are a thing of the past!

Foxboro will supply a cabinet (or cabinets) to house and protect any number of existing instruments and related devices. Or your order for new instruments can be shipped to you already mounted in cabinets, completely piped and wired, needing only simple power and process connections to be put into operation. Write for illustrated and informative Bulletin 413.



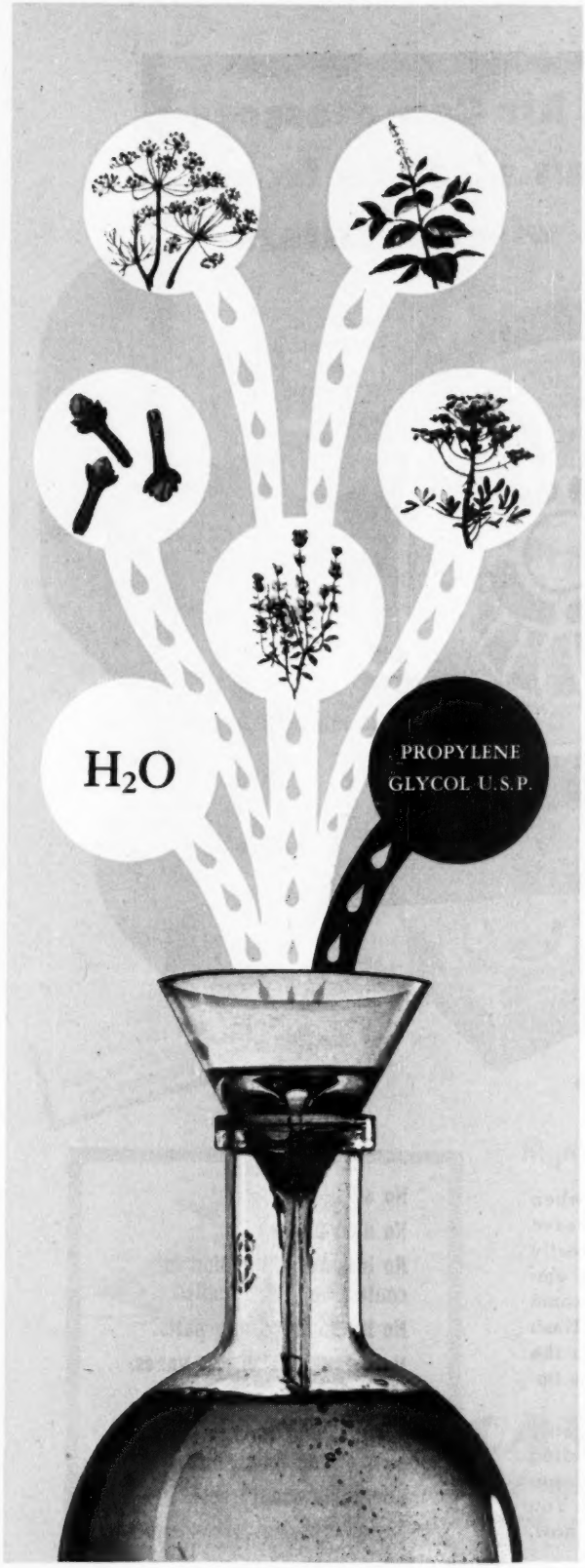


Foxboro Cabinets are available in three standard sizes for 2, 4, or 6 conventional-size instruments (or equivalent). For mounting more than 6 instruments, Foxboro Sectional Cabinets (with open ends) are used . . . bolted together to form desired length. End sections have one closed side to form dust-tight enclosure. Exclusive insert-type panel construction permits easy conversion when process changes so require.

THE FOXBORO COMPANY, 3011 NEPONSET AVENUE, FOXBORO, MASS., U. S. A.

FOXBORO REG U S PAT OFF PROCESS CONTROL CABINETS

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND



DOW

DOW PROPYLENE GLYCOL, U.S.P.,

the highly versatile solvent for your flavors and extracts . . .

. . . gaining wide acceptance for its solvent efficiency and economy over a broader range of materials.

Big reason for the success of Dow propylene glycol, U.S.P., in the food field is its high degree of solvent action over the broad range of flavoring raw materials required today. By utilizing these advantages in your operation, you will undoubtedly gain still another advantage—economy in manufacture.

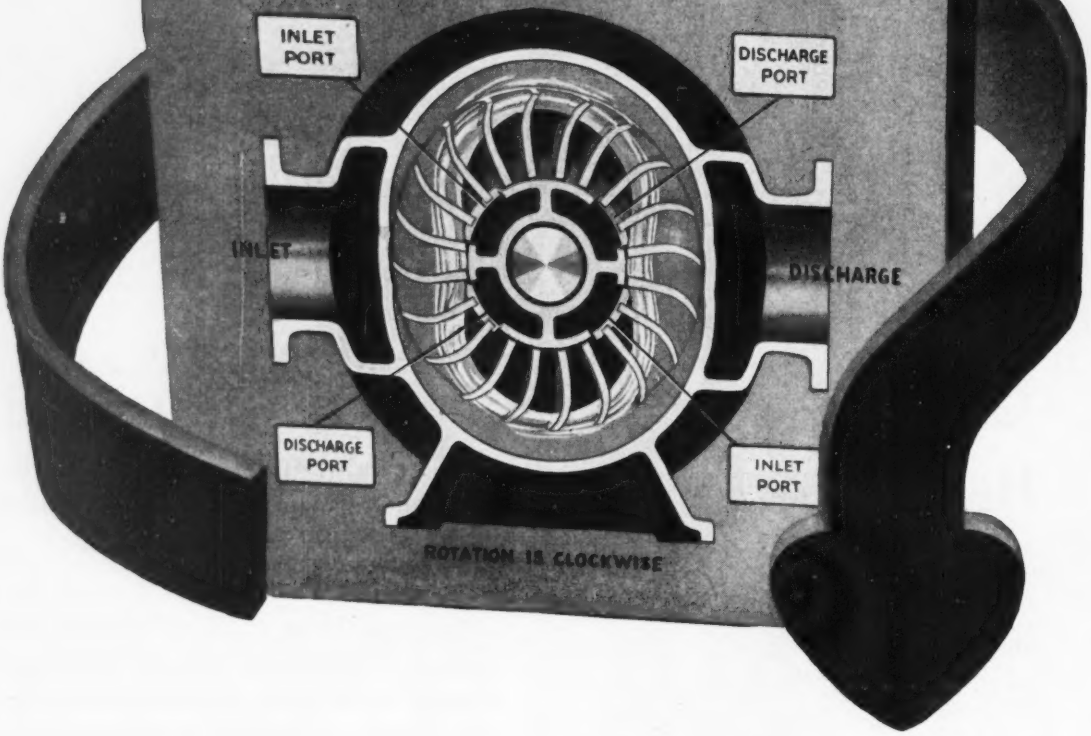
Food colors have also been improved by propylene glycol with only slight alterations in basic formulations. Emulsified flavors benefit from the very effective wetting action of propylene glycol which gives increased stability to the emulsions formed.

For an answer to the big question—"How can Dow propylene glycol, U.S.P., improve my product?"—send for a free sample and information on its properties. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dpt. OC-828E-1.

you can depend on DOW CHEMICALS DOW

For more information, use coupon on last page.

Nash Instrument Air Compressors deliver only clean air, free from oil or dust, and without filters



Here is Why!

You can dispense with oil filters and dust filters when you install ®Nash® Clean Air Compressors. You can save the cost of maintaining these devices. You can greatly reduce instrument maintenance costs. For the Nash employs no internal lubrication, therefore no troublesome oil is in the delivered air. Moreover, air from a Nash is thoroughly washed and cooled as it passes thru the pump. Dust in the plant atmosphere, even fly ash, is immediately removed.

®Nash® Clean Air Compressors are simple, with only one moving element. No valves, gears, pistons, sliding vanes, or other enemies of long life and constant performance complicate a Nash. No aftercoolers are needed. You will find it profitable to investigate these pumps, now.

No oil filters.
No dust filters.
No internal lubrication to contaminate air handled.
No internal wearing parts.
No valves, pistons, or vanes.
Non-pulsating pressure.
Original performance constant over a long pump life.
Low maintenance cost.

NASH ENGINEERING COMPANY
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since 1887 / Glycerine helps maintain the Flavor

Glycerine can perform an unusually wide range of functions for food processors. Take flavoring products for example. Glycerine is often the principal solvent; the compatibility of its own pleasant taste with other flavors is a valuable asset; and its viscosity adds body.

In candy making, Glycerine lends smoothness and increases softness and palatability. In the manufacture of meat casings, Glycerine acts as a plasticizer—promoting flexibility by retaining moisture.

In the processing of ice creams, wines and beers, dried fruits and nuts, bakery goods and many other food products, U.S.P. Glycerine is chosen for its ability to act as a humectant, sweetener or solvent. In all these capacities, Glycerine helps to maintain food flavor and quality right through to the ultimate consumer. And, what is very important, U.S.P. Glycerine's freedom from toxicity makes it safe for use in food products.

For almost 70 years, confectioners, bakers and soda fountains have used flavoring extracts made by W. Sheinker & Son. For all these years, W. Sheinker & Son has found that U.S.P. Glycerine is an excellent solvent for the company's flavoring extracts.

Nothing takes the place of Glycerine

TECHNICAL DATA

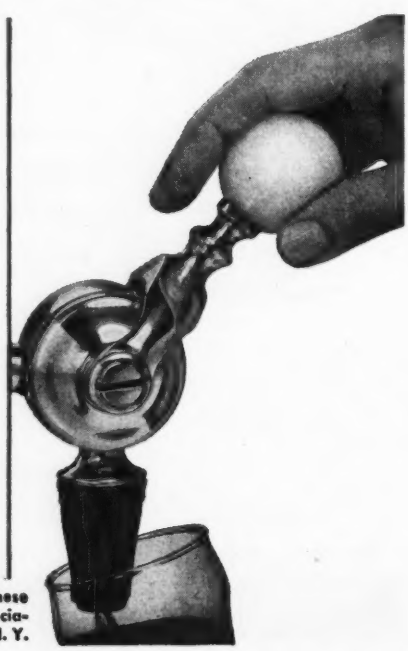
which you should have

20-page booklet on Glycerine for product conditioning

12-page booklet on Glycerine standards and specifications

16-page booklet on Glycerine properties and applications

For your free copy of any or all of these booklets, write Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.

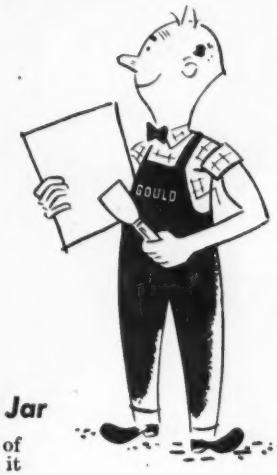


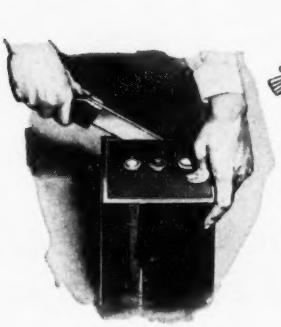
BATTERY MAINTENANCE TIP #2

from the GOULD Plus-Performance Plan

BEST WAY TO REMOVE ELEMENT FROM JAR

When accidental damage requires installing an element in a new jar, the element complete with cover must be removed. The Gould Plus-Performance Plan shows you how this can be accomplished easily and with safety.



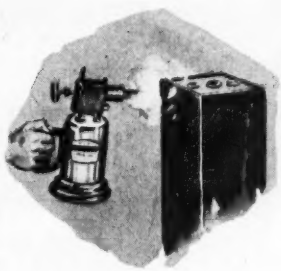


1. *Cut Bond Between Cover and Jar*

Cut the compound from around the top of jar, using warm compound knife, keeping it very close to inside of jar wall.

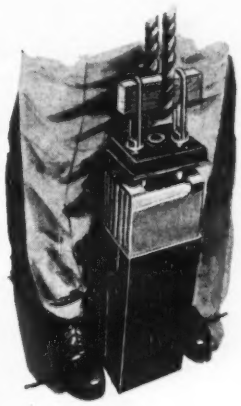
2. *Heat Outside of Jar Before Pulling*

To make sure there is no hardened compound to restrain the pulling of the element, heat the outside top of all four sides of the jar with a blow torch. Warm thoroughly, but do not melt or burn the jar.



3. *Pull Element from Jar*

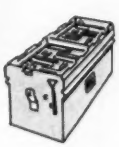
Using Gould Jar Hold Down Clips (Part No. 2-1445) and Gould Cell Puller (Part No. 77061) as shown here, lift element halfway out of jar. Allow element to drain for minute or two, then remove and place immediately in new jar or lay it on flat insulated surface such as wood, for servicing.



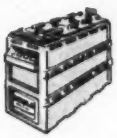
GOULD Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

For Railroad Air Conditioning and Lighting


For Mine Shuttle Cars and Locomotives

For Electric Industrial Trucks


For Diesel Locomotive Starting

For Standby and Emergency Power

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Always Use Gould-National Automobile and Truck Batteries

Here is one more example of how the Gould Plus-Performance Plan can help you save money by performing many service operations in your own shop. For the complete Plan, mail the coupon TODAY.

BATTERY INFORMATION HEADQUARTERS
Dept. FE-114 Trenton 7, N. J.

Please send me, without charge or obligation, the Gould Plus-Performance Plan for _____ batteries.
(type or types)

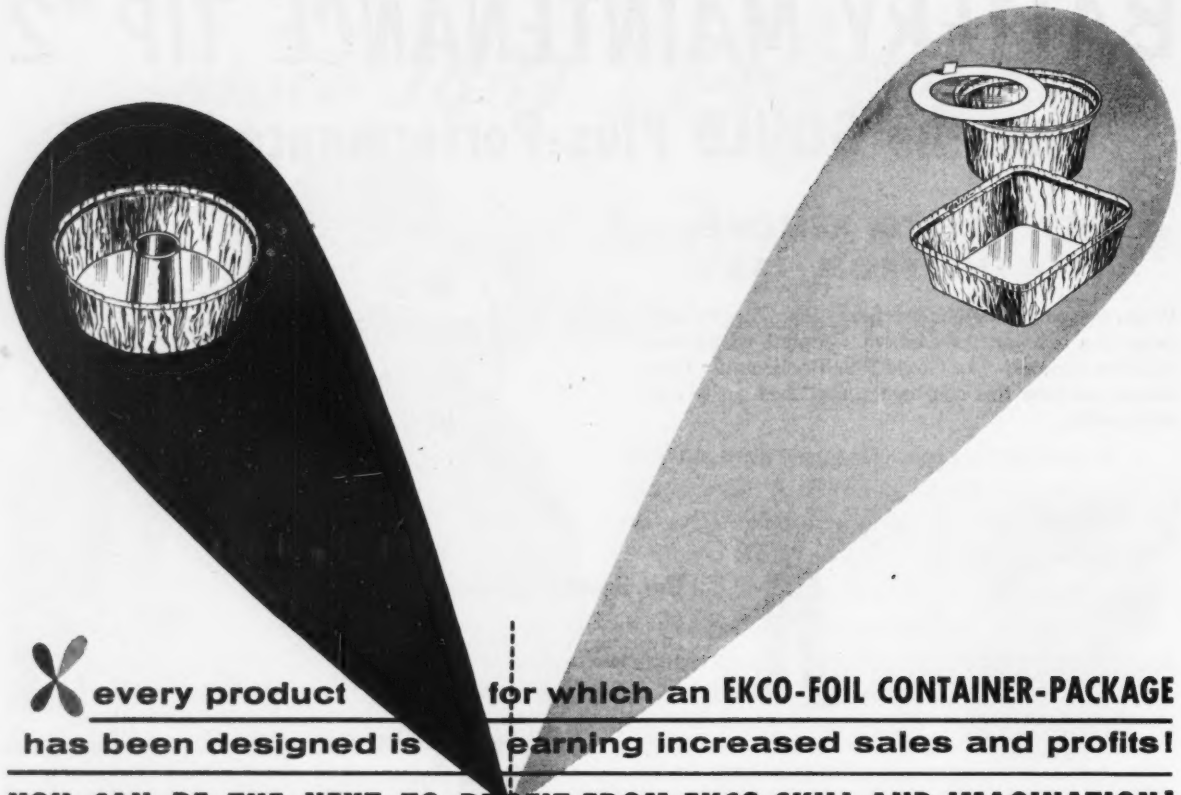
Name _____

Firm _____

Address _____

City _____ Zone _____ State _____

For more information, use coupon on last page.



every product has been designed is for which an EKCO-FOIL CONTAINER-PACKAGE earning increased sales and profits!

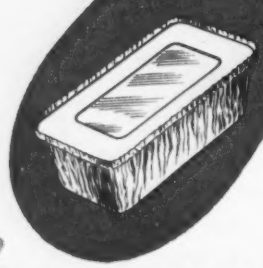
YOU CAN BE THE NEXT TO PROFIT FROM EKCO SKILL AND IMAGINATION!

Ekco has been designing and making quality metal containers for more than 67 years. This long experience, combined with skill and ingenuity, makes Ekco best qualified to help you sell more, *make more money*, with rigid aluminum foil packaging.

Ekco has 105 sizes and shapes of rigid aluminum foil containers for you to choose from, and only Ekco can make them for you in quantity. Ekco has the industry's most modern and complete facilities to serve you better!

At no cost to you, an Ekco packaging engineer will point out the possibilities, or, quite frankly, the limitations of aluminum foil packaging for your product. Let him show you what Ekco-Foil can do for *your* business!

Send us your package. Let Ekco packaging engineers examine it and make recommendations that can increase your profits!



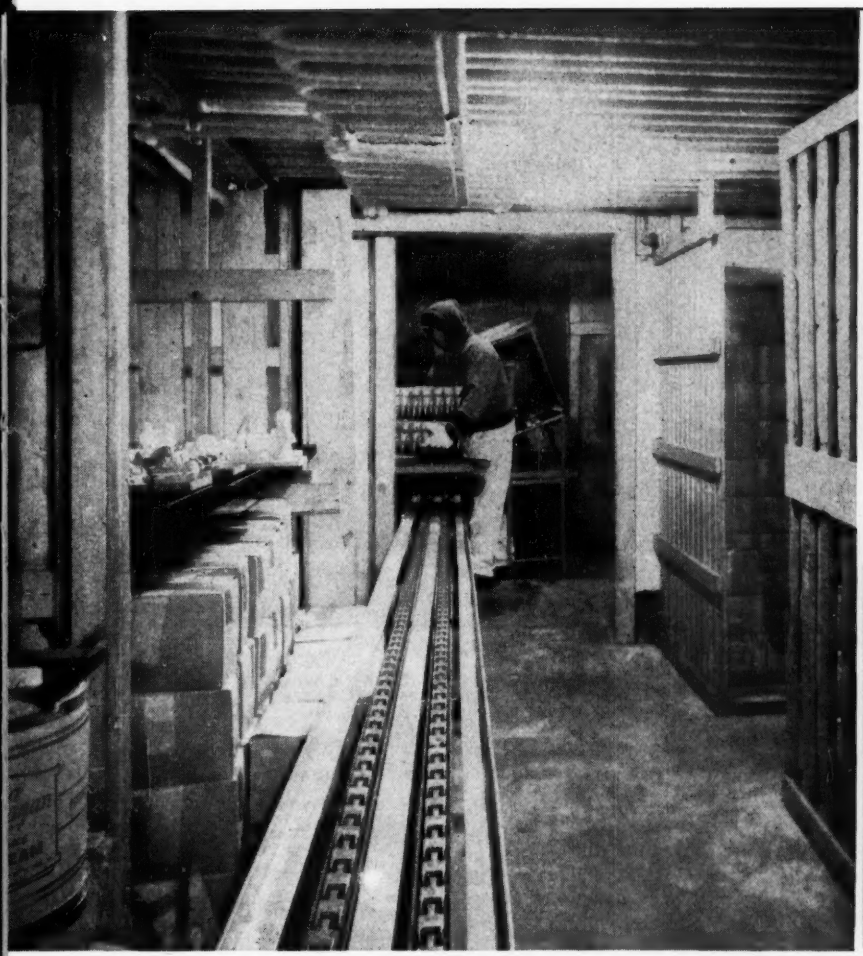
cut costs, increase profits!

Ekco-Foil, the newest idea in "convenience foods" packaging, reduces handling, maintenance, and costs! Your product sells faster, too, because Ekco-Foil retains flavor longer. It gives greater taste appeal and a clean, distinctive appearance. Process and sell in the same container-package! Call your Ekco salesman or distributor today!

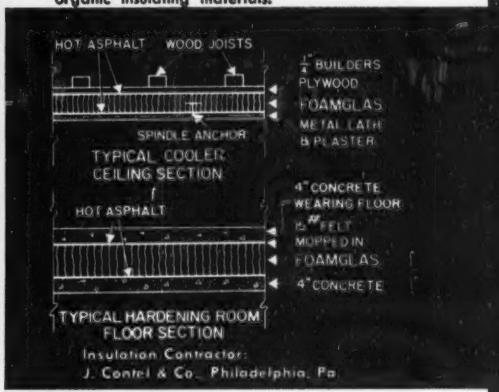
EKCO®

EKCO-FOIL CONTAINER DIVISION

Ekco Products Co., 1949 Cicero Ave., Chicago 39, Ill. • Also available from Ekco Products Co. (Canada) Ltd., Toronto



In the hardening room (left) at their Sunny Ridge plant and in coolers at the Germantown Branch (above), Abbotts Dairies have used FOAMGLAS to replace deteriorated organic insulating materials.



"Ten years of outstanding insulating performance proved FOAMGLAS stays dry!"

states P.J. Stromback, Chief Engineer, Abbotts Dairies, Inc., Philadelphia

"Our ten years' experience with FOAMGLAS has proved to us that this unique cellular glass insulation is absolutely impervious to moisture and even unaffected by ammonia," states P. J. Stromback, Chief Engineer, Abbotts Dairies, Philadelphia. "The need for major reconstruction of several milk cooling and ice cream hardening rooms led us to make exhaustive characteristic studies of the various kinds of insulation available. The results of these studies, plus the impressive ten-year performance record of our initial FOAMGLAS installation, have led us to use it in all three of our plants.

"FOAMGLAS has proved to be completely waterproof, despite frequent washdowns of our refrigerated space, thus retaining its full insulating efficiency. Since FOAMGLAS is inorganic, it isn't harmed even by occasional ammonia leaks. We've found that its strength and rigidity protect us, too, from the danger of sinking floors and bulging walls. Since FOAMGLAS is vermin-proof, it has helped us avoid the rat problem."

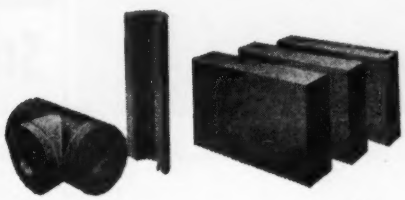
Mr. Stromback's report concludes: "FOAMGLAS has given us outstanding insulating performance while helping to keep our maintenance costs at a minimum. We'll continue to use it to replace other insulation in reconstruction of refrigerated spaces at our Sunny Ridge, Germantown Branch, and 31st and Chestnut Street plants. Construction of a new milk storage box, using FOAMGLAS, has just begun at our Ambler plant."

FOAMGLAS has proved its outstanding multiple benefits in long service at Abbotts Dairies. Why not investigate the many benefits *you* will get when you insulate with FOAMGLAS? Write today for a sample and our booklet describing the use of FOAMGLAS to insulate cold storage space.

PITTSBURGH CORNING CORPORATION • Dept. O-114 • One Gateway Center • Pittsburgh 22, Pa.

FOAMGLAS®

the cellular, stay dry insulation



Pittsburgh Corning also makes PC Glass Blocks

it may help you!

Titanium is a metal the world has known for a long time—and now you can put its unusual combination of valuable properties to work for you in the form of Carpenter Titanium Tubing.

It's light. It's strong. It has a remarkable endurance limit. Weighing about 56% as much as high alloy steel, titanium has a tensile strength that compares favorably with many steels. It possesses an endurance ratio well above both steel and non-ferrous metals.

Carpenter Titanium Tubing is highly resistant to most corrosives, salt water and salt atmospheres. Its extreme resistance to erosion and cavitation is unique among metals. Yet, with all this, Carpenter Titanium Tubing is ductile, may be successfully machined.

With all these desirable characteristics—in combination—it may be that Carpenter Titanium Tubing can help you solve a number of design and production problems.

If you would like more information about Carpenter Titanium Tubing, and its place in your product or plant, write today to:

MEMBER

The Carpenter Steel Company,
Alloy Tube Division, Union, N.J.

Export Dept.: The Carpenter Steel Co., Port Washington, N.Y. "CARSTEELCO"

Carpenter

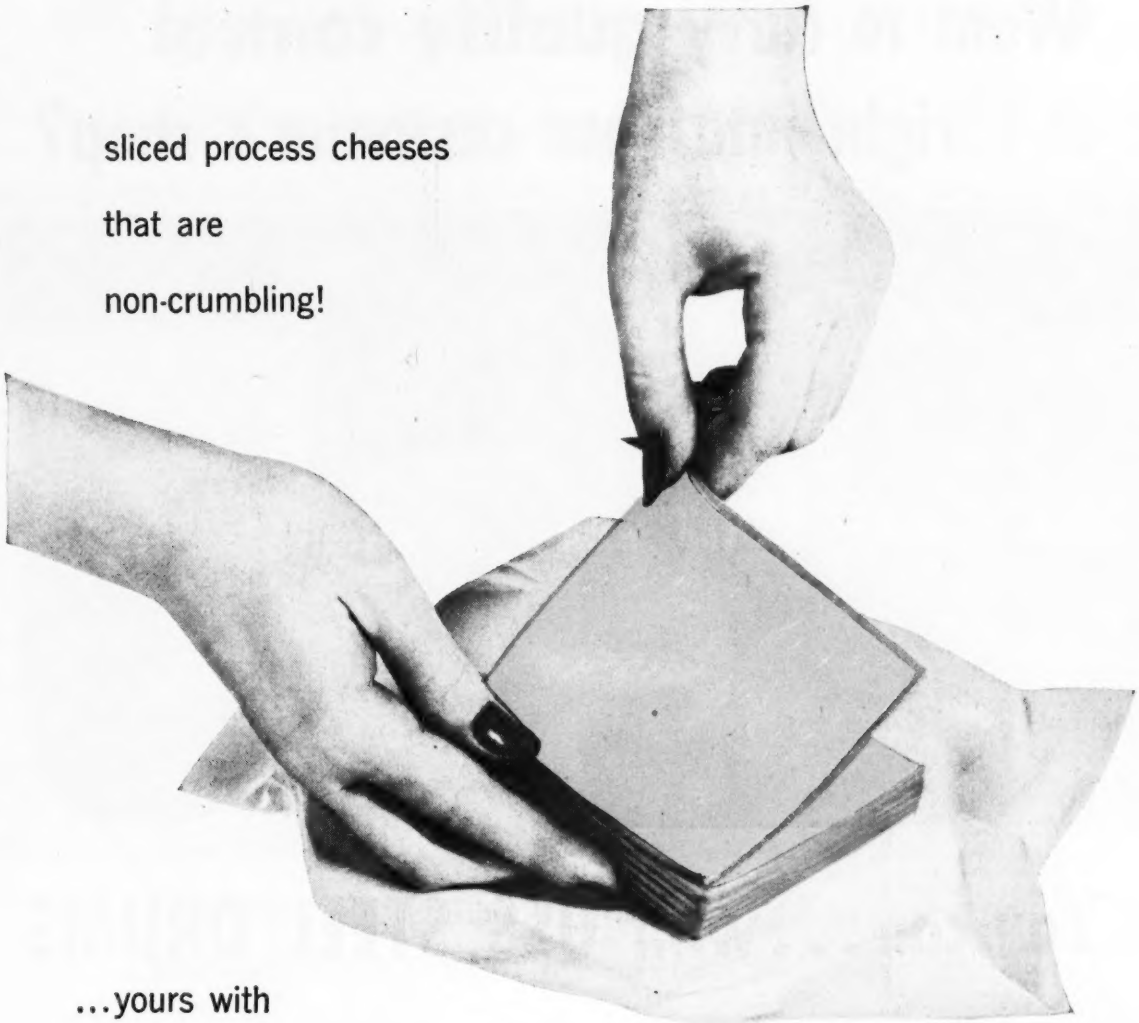
more than corrosion resistance

Stainless Tubing & Pipe

sliced process cheeses

that are

non-crumbling!



...yours with

PFIZER SODIUM CITRATE

● More and more people are buying *sliced* process cheeses. When they open your brand, do they find what they expect... firm, non-crumbling slices? They *will* if you use Pfizer Sodium Citrate as an emulsifier.

Sodium Citrate controls the body and texture of your process cheeses during and after processing. It makes possible easy, non-crumbling slicing... avoids that grainy, mealy consistency.

Result? Your product has the eye-appeal... the *buy*-appeal that insures repeat customers.

Switch to Pfizer Sodium Citrate for uniformly high results in product quality... in sales performance!

CHAS. PFIZER & CO., INC.

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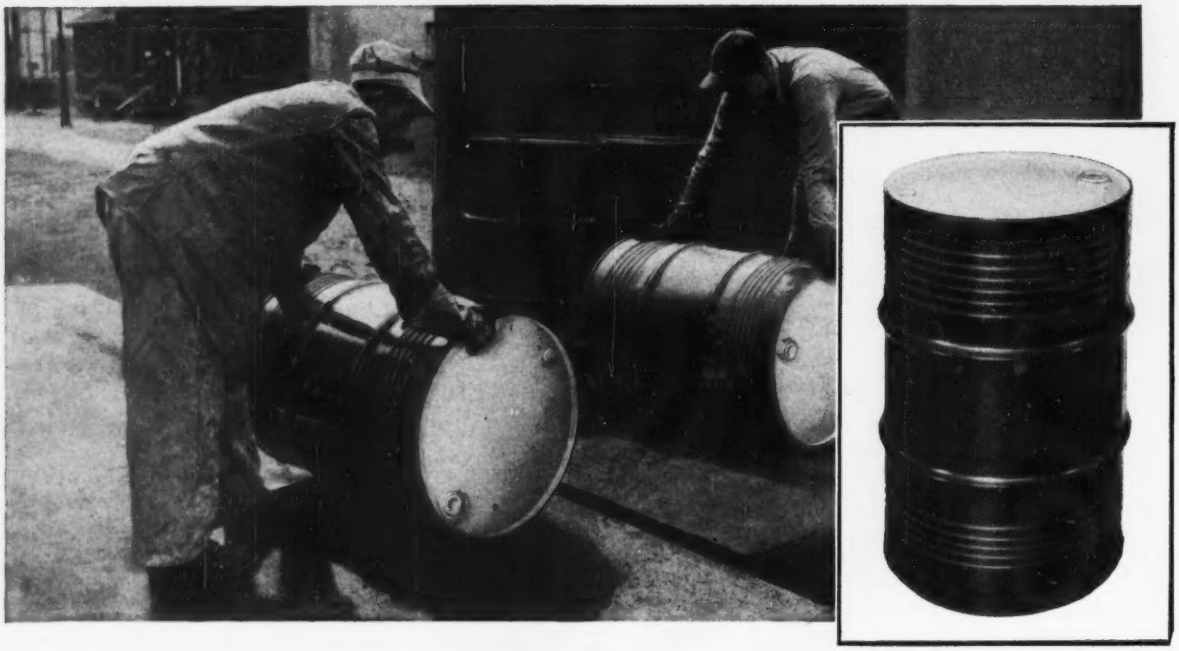
Want to carry quality control right into your customer's shop?



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THERE's no need to stop quality control when products leave your plant. With USS scale-free, rust-inhibited Drums you can carry it *all the way* . . . when your customer is ready to use your products, they will be as clean and uncontaminated from scale, dirt, grease and rust as when they were packaged.

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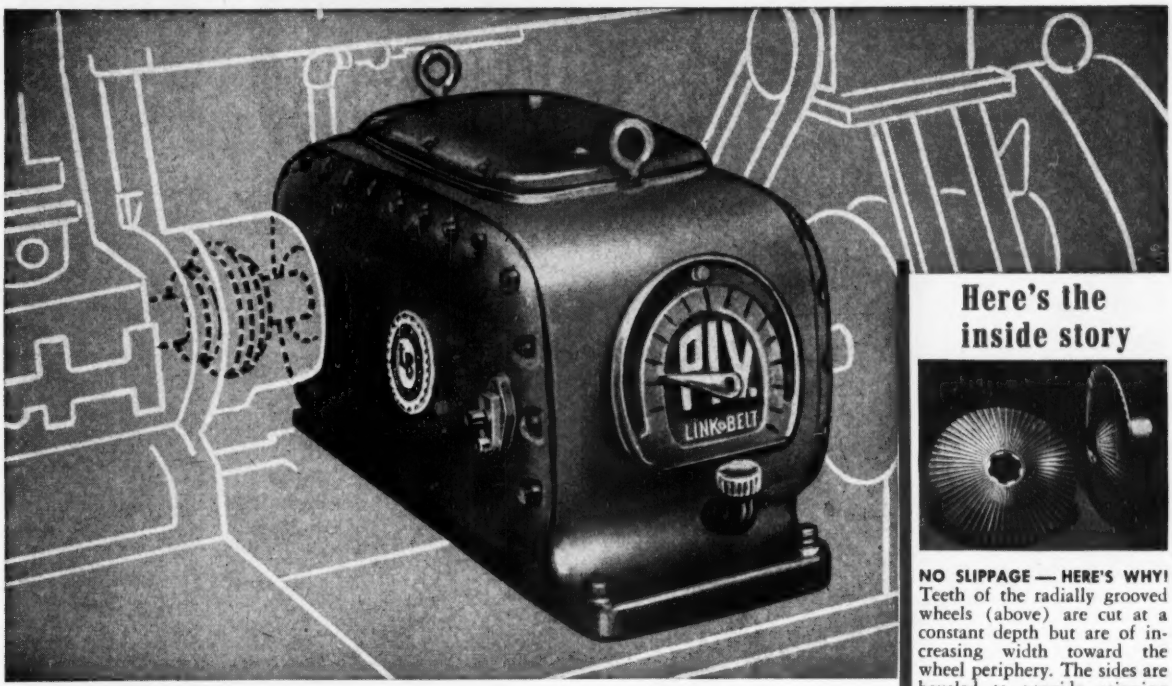

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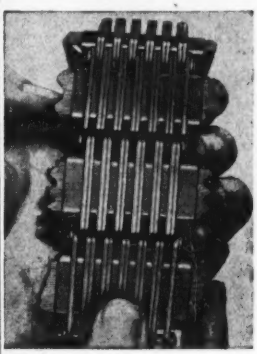

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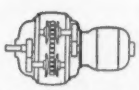
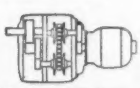


Motorized P.I.V. with single reduction input and output helical gears.



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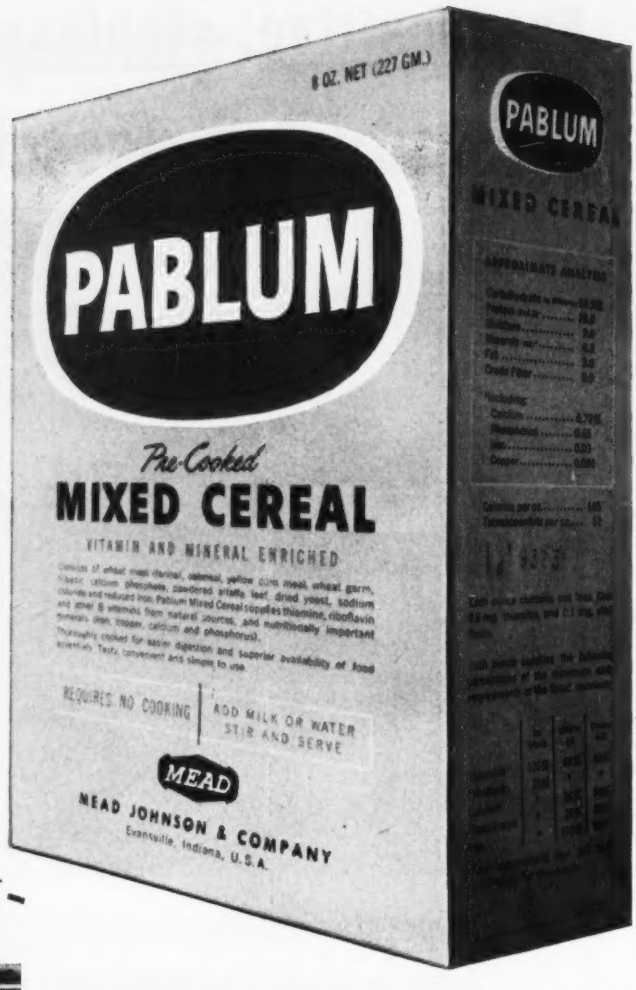
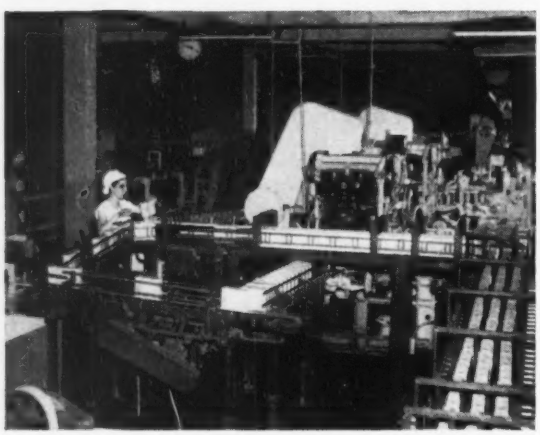


IT'S PABLUM FOR HIM –



Pneumatic's High-Speed Tight Wrappers applying labels to the Pablum packages at Mead Johnson's Evansville, Indiana, plant.

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"Food sales depend on *food flavor* more than anything else," says Mr. Paulucci. "It's one ingredient the food processor *must* package with his product if he wants to win steady customers to his brand name."

Yes, flavor makes sales

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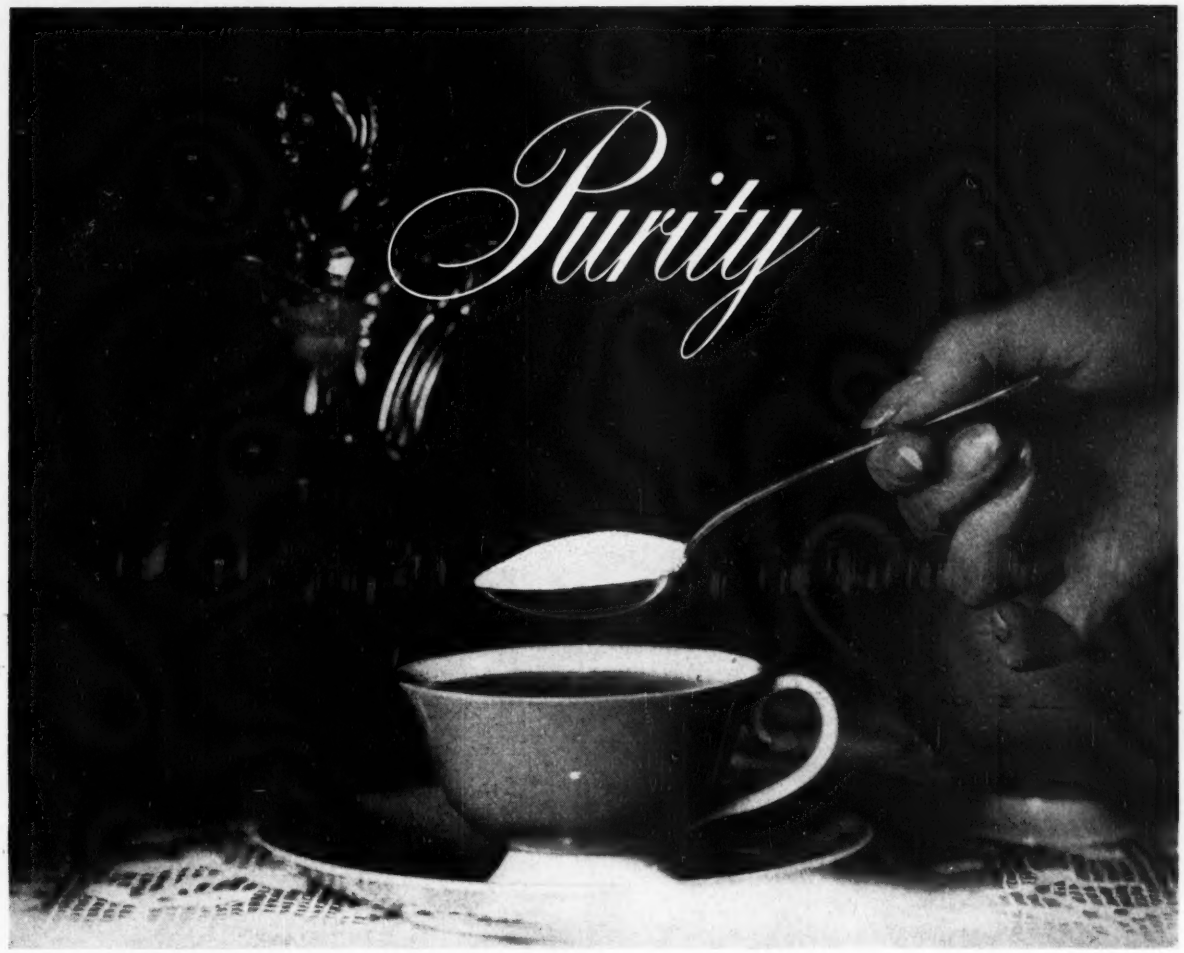

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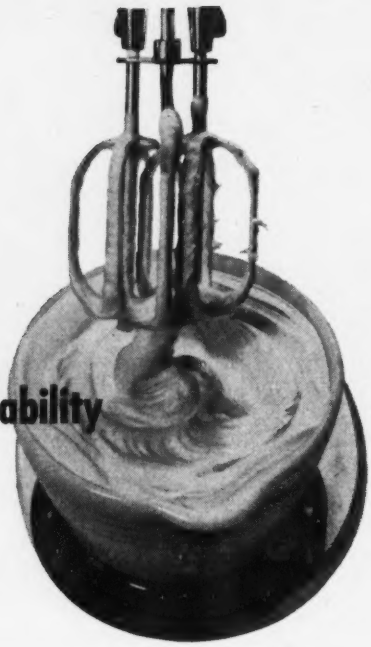
More about monoglycerides and whippability



Things move fast in today's food processing industry. It was only very recently that we told of some commercially exciting improvements in overrun and decreased whipping time that you can get in milk-based products by the addition of small percentages of Myverol® Distilled Monoglycerides. Now we have further news on the subject:

Shelf life Homogenize cream and you increase its shelf life. That's fine, except homogenized cream doesn't whip easily. But homogenize a Myverol monoglyceride into the cream and you improve both shelf life *and* whippability.

Temperature It is normally required that certain products be chilled carefully before whipping. Evaporated milk or light cream must be at or near 32 F to whip. Both are whipped readily at 50 F if they contain 1% of Myverol Distilled Monoglycerides, *Type 18-30*.

Churning Extreme care is required when whipping cream to avoid forming butter. But our laboratories have found the inclusion of Myverol monoglycerides to permit up to 10 minutes of beating after full whip with still no indication of churning. Untreated, the same cream churned immediately upon whipping.

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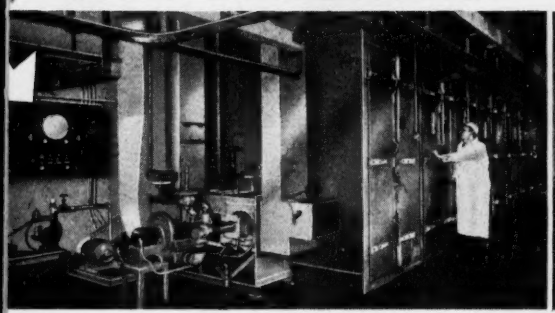
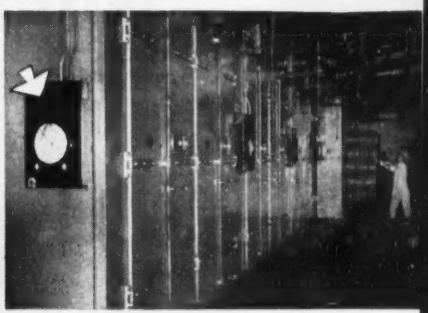
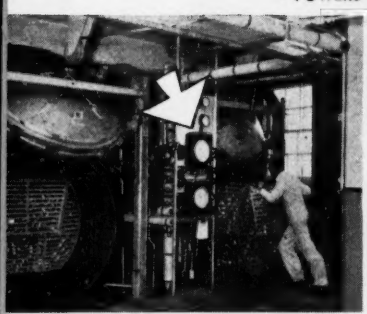
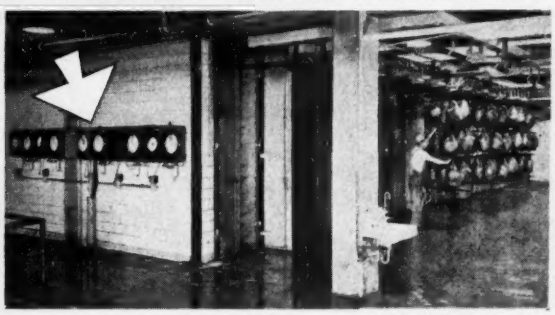
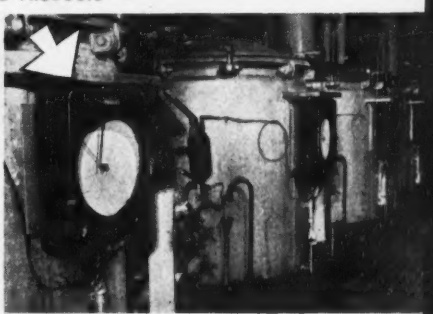




POWERS CONTROL HELPS INSURE UNIFORM QUALITY AND FLAVOR OF FOOD PRODUCTS







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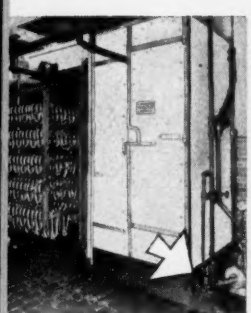

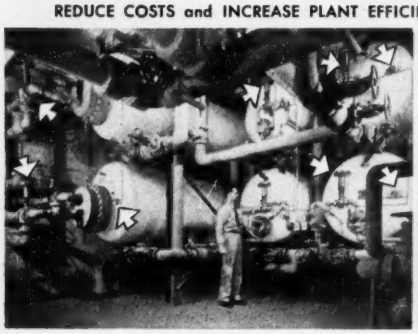

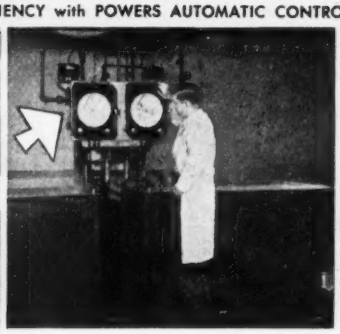

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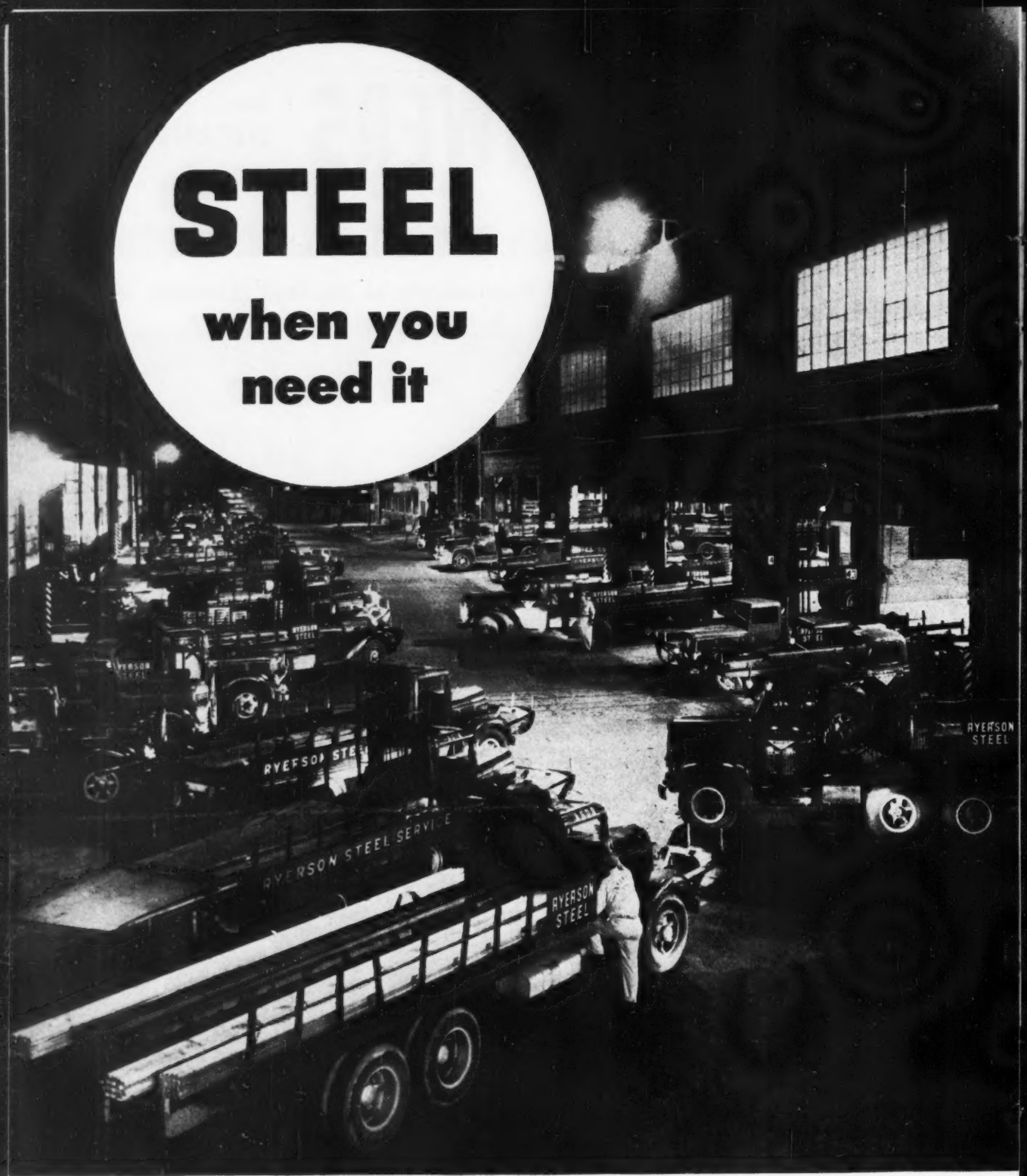

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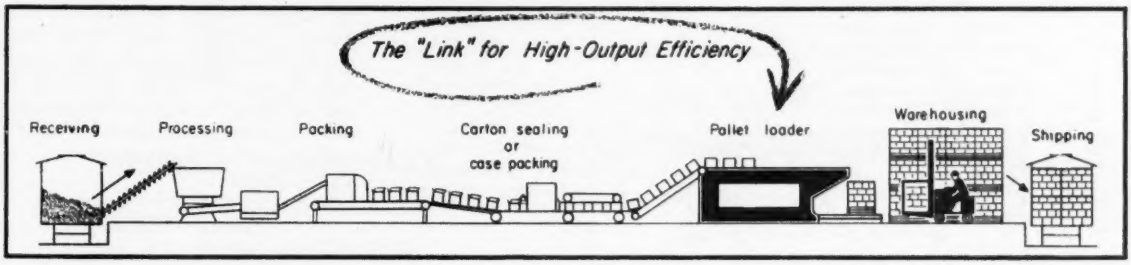


Should Your Plant *Palletize Automatically?*

Here are the pertinent facts on the pallet-loading machine—how it works where it fits in, costs involved as compared with manual operations, and how you can "figure whether it's for you"

G. D. BEAVER

Manager, Pallet Loader Division, Lamson Corp., Syracuse, N. Y.

"Will it pay us to palletize automatically in our plant?"

That's the question asked by many of today's processors. And the answer is "yes"—if the packing line is large enough to justify the initial cost and installation expense of the necessary equipment.

We will detail here how to check your own lines for size. But first, let's see exactly how an automatic pallet loader performs.

Until a few years ago, even the most advanced material handling systems used manual labor to take cartons leaving the sealing machine and stack them into predetermined patterns on pallets. Depending on the production rate of the plant, a crew of up to 10 men was needed for this one palletizing operation. Several years ago the automatic pallet loader was developed to supply the missing link in the otherwise highly automatic materials handling system.

The pallet loader does what its name implies. It is an automatic machine that receives cartons from one or more sealing machines and stacks the cartons on pallets according to desired pattern. As each pallet is loaded, it is automatically ejected from the machine and is replaced by an empty pallet. As long as the flow of cartons keeps coming and a supply of empty pallets is maintained, the loader will continue to operate without attention.

Advantages of the loader are substantial. First, it practically eliminates manual handling of cartons after they leave the packaging machine. In a plant moving 25 cartons per minute, the saving in manpower often exceeds 200 man-hours per shift per week.

Second, the output of the loader is uniform in both quantity and quality. It can handle up to 35 cartons a minute. Naturally, there's no fatigue or slowdown, and breakage of merchandise and damage to cartons are substantially less than with manual handling. Every pallet is stacked evenly. The load is compact, stable, and free of overhang. Consequently, each pallet requires minimum storage space and can be moved without snagging adjoining structures.

Third, by means of a system of collecting conveyors, the output of a number of packaging machines scattered throughout a plant can be palletized at a single point by a single loader. With proper controls, a loader can handle the output of packaging equipment that is operating on a partial shift or sporadically, and where

Toward Automatic Processing

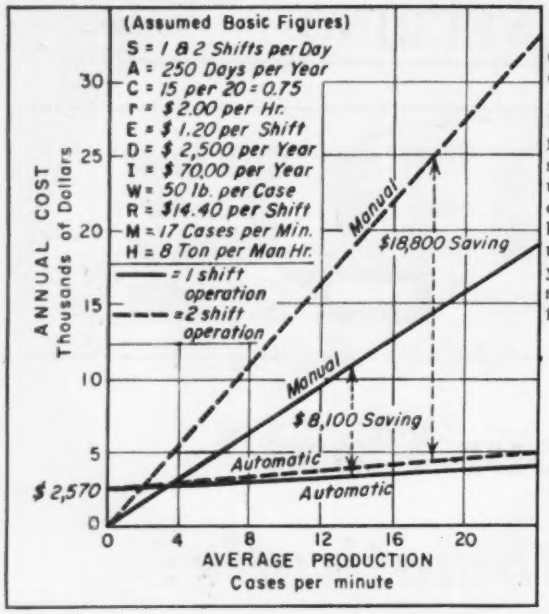
"Automation" is a word we're seeing more and more often these days. True, the prospect of the automatic processing plant—one that will receive raw materials at one end and turn out a finished, packaged product at the other using just a few supervisors—is alluring.

But for most plants the day of complete automation is far off. And for many it will never come because of the high equipment and instrument costs involved.

Nevertheless, there are elements in the idea of automation that already are being applied to present-day plant operations. One of these elements is automatic material handling.

Every plant that produces a high-volume packaged output must have some means of transferring the product from the package sealing machine to the point of shipment or storage. In most plants having more than a minimal output, the individual cartons delivered from the sealing machine are stacked on pallets.

By collecting a sizable number of cartons on a single pallet—a movable wood or reinforced paper platform a few inches high and approximately 3 by 4 ft.—handling becomes much more economical. The unit-load permits a larger handling volume per trip, simplifies storage and inventory and speeds subsequent handling in shipment.—*G. D. Beaver*


(Assumed Basic Figures)
S = 1 & 2 Shifts per Day
A = 250 Days per Year
C = 15 per 20 = 0.75
r = $2.00 per Hr.
E = $ 1.20 per Shift
D = $ 2,500 per Year
I = $ 70.00 per Year
W = 50 lb. per Case
R = $14.40 per Shift
M = 17 Cases per Min.
H = 8 Ton per Man Hr.
= 1 shift operation
= 2 shift operation
ANNUAL COST Thousands of Dollars
Manual
$18,800 Saving
Manual
$8,100 Saving
Automatic
$2,570
Automatic
AVERAGE PRODUCTION Cases per minute

COMPARATIVE COSTS on manual and automatic palletizing are shown for one- and two-shift operations under given set of conditions. Variables are listed at upper left. For your problem, substitute proper figures.

a full-time loading crew would be expensive.

Where Justified

The pallet loader is neither intended nor recommended for every plant having a packaging operation. It is a relatively expensive piece of equipment, costing about $25,000, and it may require an additional investment in collecting conveyors and automatic controls.

Thus, the ultimate justification for installing the high-efficiency pallet loader lies in the economic sphere. Question is whether the initial cost of the system will be offset by the worthwhile savings in plant operations.

Several years ago F. N. Landon of Sun Oil Co., one of the early users of pallet loaders, developed a very interesting cost analysis that bears closely on this question of the economic justification of pallet loaders.

Using this system, annual costs of pallet stacking by manual labor and by the automatic pallet loader are compared in an accompanying graph chart. It is important to note that the figures are based on an assumed plant production rate of about 15 cartons per minute, each weighing 50 lb., and that the average stacking rate of a manual worker handling these cartons is 5¼ cartons per minute.

Two sets of lines are shown, one comparing the costs of manual and automatic operations on a one-shift basis, the other making the same comparison for two shifts. These lines intersect at the average production rate of about 4 cases per minute. Thus, above this production rate, automatic handling operations start to become economical.

In practice, however, the generally accepted production rate at which an automatic pallet loader system is considered economically *justified* is about 15 cartons per minute, since the cost of the entire system must be considered.

Mr. Landon's figures indicate a saving of $8,100 per year on a one-shift plant operation averaging 15 cartons per minute, and a saving of $18,800 on a two-shift operation producing 17 cartons per minute. These savings are estimated on the basis of the output rates just specified and considering ability of a laborer to handle 5¼ of the 50-lb. cartons each minute.

In other plants the savings would be smaller where workers stacked more per minute, (as they could if the cartons were lighter), or greater where their rate was less. Other factors considered in Mr. Landon's estimated savings are given on the curve itself.

From these curves we have two important generalizations that apply to any processing plant. First, below a certain production rate manual pallet loading is more economical. Second, above the break-even point, the cost of manual stacking increases rapidly, whereas the cost of operating the loader increases only slightly. Consequently, the higher the plant production rate, the higher the savings that can be realized with automatic palletizing.

As an aid in calculating relative operating costs, Mr. Landon worked out the following formulas:

Pallet Loader Operation

Annual cost in dollars = $S \times A \times C\ (1.5r + E) + D + I$ . . . where S is number of shifts worked per day; A is number of days of operation per year; C is average cartons per minute of plant production divided by average cartons stacked by loader per minute; r is one-hour wages for first-class mechanic for maintenance plus materials; E is cost of 10 hp. electricity for one shift; D is annual depreciation cost of equipment (about $2,500); and I is annual insurance cost on loader (about $70).

Manual Palletizing

Annual cost in dollars = $60 \times S \times W \times A \times R \times M/2{,}000 \times H$ . . . where the S and the A are same terms as explained in loader-cost formula above; W is weight of a single carton (lb.); R is laborer's daily rate (dollars); M is maximum cartons per minute of plant production (since working force must be staffed to handle peaks); and H is tons of cartons handled per man-hour (figured to include stand-by workers hired for relief of regular crew—usually one extra man per crew).

Using these two formulas, and applying production rates and wage scales for a particular plant, a fairly good comparison can be made between the two methods of pallet loading in a plant.

Loader Capacities

Assuming that an automatic loader can be justified on the basis of savings over manual operations, let's examine some of its performance capabilities: First, its capacity: The loader can palletize up to 35 cartons or cases per minute when handling one type and size of load and up to 30 cartons or cases when multiple sizes are being run.

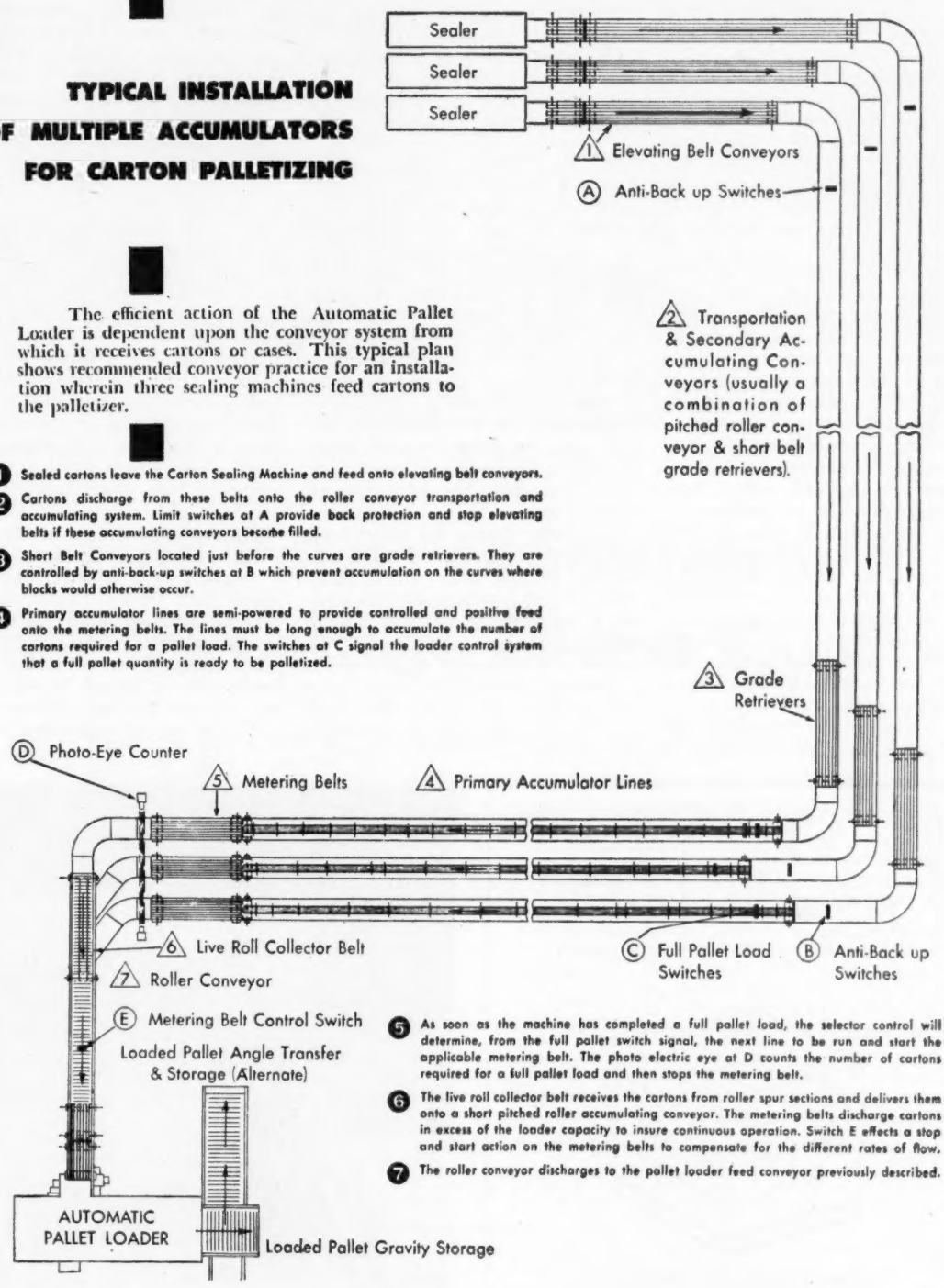
Some of the capacity variables: Length of cartons, number of cartons to be turned to produce interlocking patterns, size of pallet, number of cartons per pallet, height of pallet load, and number of accumulating lines.

Because of the longer cycle needed, more complicated stacking patterns generally reduce the handling capacity of the loader. The standard loader is designed for 3,000-lb. unit loads, with a maximum of 1,000 lb. per layer. In instances where pallets measure 44 in. or less on each side, the loader can handle up to 3,500 lb. safely.

The standard model handles pallets ranging from 33 to 48 in. wide, and 32 to 48 in. long. Here, maximum height of the unit load, including pallet, may not exceed 71 in. Including overhang, the maximum width of the unit load cannot exceed 52 in., or the length, 50 in. However, modified

TYPICAL INSTALLATION OF MULTIPLE ACCUMULATORS FOR CARTON PALLETIZING

The efficient action of the Automatic Pallet Loader is dependent upon the conveyor system from which it receives cartons or cases. This typical plan shows recommended conveyor practice for an installation wherein three sealing machines feed cartons to the palletizer.


Sealer
Sealer
Sealer
1 Elevating Belt Conveyors
A Anti-Back up Switches
2 Transportation & Secondary Accumulating Conveyors (usually a combination of pitched roller conveyor & short belt grade retrievers).
3 Grade Retrievers
D Photo-Eye Counter
5 Metering Belts
4 Primary Accumulator Lines
6 Live Roll Collector Belt
7 Roller Conveyor
E Metering Belt Control Switch
Loaded Pallet Angle Transfer & Storage (Alternate)
C Full Pallet Load Switches
B Anti-Back up Switches
AUTOMATIC PALLET LOADER
Loaded Pallet Gravity Storage

1. Sealed cartons leave the Carton Sealing Machine and feed onto elevating belt conveyors.
2. Cartons discharge from these belts onto the roller conveyor transportation and accumulating system. Limit switches at A provide back protection and stop elevating belts if these accumulating conveyors become filled.
3. Short Belt Conveyors located just before the curves are grade retrievers. They are controlled by anti-back-up switches at B which prevent accumulation on the curves where blocks would otherwise occur.
4. Primary accumulator lines are semi-powered to provide controlled and positive feed onto the metering belts. The lines must be long enough to accumulate the number of cartons required for a pallet load. The switches at C signal the loader control system that a full pallet quantity is ready to be palletized.
5. As soon as the machine has completed a full pallet load, the selector control will determine, from the full pallet switch signal, the next line to be run and start the applicable metering belt. The photo electric eye at D counts the number of cartons required for a full pallet load and then stops the metering belt.
6. The live roll collector belt receives the cartons from roller spur sections and delivers them onto a short pitched roller accumulating conveyor. The metering belts discharge cartons in excess of the loader capacity to insure continuous operation. Switch E effects a stop and start action on the metering belts to compensate for the different rates of flow.
7. The roller conveyor discharges to the pallet loader feed conveyor previously described.

machines can be built to handle larger or smaller sizes.

Stacking Patterns

So much for the physical capacities. Now, what kind of stacking patterns can it deliver? In general, the machine can duplicate virtually any stacking pattern that can be produced manually.

In plants producing more than one product and/or in different carton sizes, the most stable stacking pattern must be worked out for each carton size. Although in principle the loaders can form an almost infinite variety of patterns, individual units can provide up to 18 patterns interchangeably. Even so, such variety is rarely called for, since most plants utilize less than six different carton sizes.

The pattern is controlled by an electronic cartridge that causes the loader to follow a set sequence of operations. Regardless of the specific pattern used, the basic requirement for every arrangement is the interlocking stack. In interlocking, alternate layers of cartons are arranged to prevent the "seams" between the adjoining cartons from forming an unbroken vertical line.

The space between two adjoining cartons is covered by a carton on the layer above (see pattern illustration), so that the entire load is stable and hence less likely to topple during handling. Incidentally, it is not possible to get an interlocking pattern with cubical boxes without either excessive overhang or waste of pallet space.

An example of the patterns for different carton sizes may be found in the breweries. These firms have largely standardized on the 32 by 38 in. pallet for shipments outside the plant. Interlocking is obtained by having alternate layers rotated 180 deg. with respect to each other (though each layer is formed carton by carton).

Formation of the alternating pattern on successive layers is done entirely automatically by the cartridge controlling the loader sequence.

Conveyor Feeding Systems

Where a single sealing machine does not have a 30-carton output, usual practice is to feed several sealers into the unit. This arrangement calls for collecting conveyors to store cartons coming off each sealer until there is a full pallet load. A typical multi-feed arrangement is shown in our full-page plate.

Here, each sealer is connected by power and gravity roll conveyors to an accumulator line that is long enough to accommodate the number of cartons equal to about 1½ pallet loads. An electric limit switch is mounted on each accumulator line at a distance equal to the sum of the lengths of the cartons making up a full pallet load. This switch is depressed for a few consecutive seconds when a full pallet load has been accumulated, thus sending a signal to the cartridge on the loader.

One of the controls on a loader is a scanning device that hunts for a full pallet signal from the limit switches on each of the accumulating lines. If no signal is received from the switch on the first line, the sequence selector will test the signal from each of the other lines in succession. When a full line is detected, the selector control will choose this line as the next line to feed the loader.

As soon as the loader is ready to start a new cycle, the control selector will start the powered "metering" belt from the filled accumulator line. At the front end of this belt is a photocell counter that registers the number of cartons coming by.

So as soon as a full pallet load has passed the counter, there is automatic shut-down of the metering belt, and no further cartons are fed to the loader. The line selector system is then ready to pick another line and the cycle repeats.

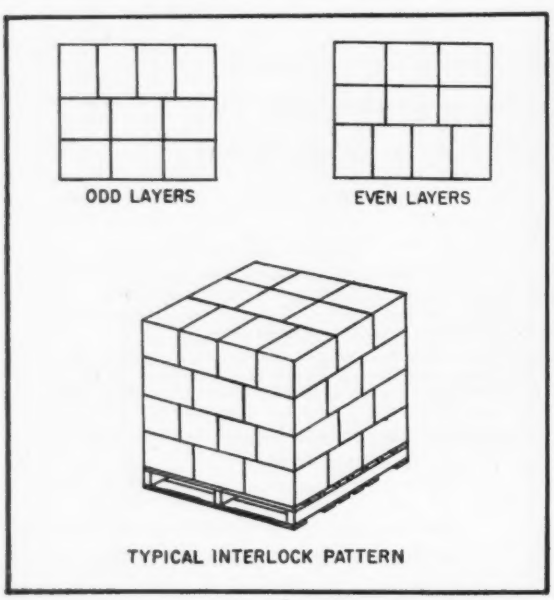
How Loader Operates

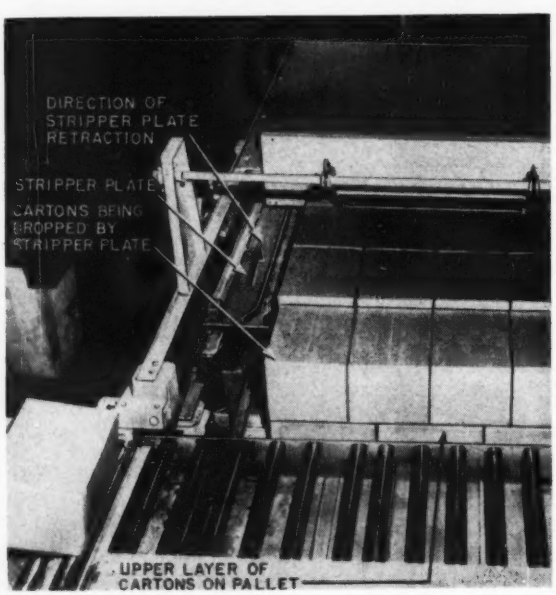
The cartons are delivered from the metering belt to a section of conveyor leading to the loader. Just before they move into the loader, an automatic deflector guides them into proper alignment. Cartons then travel to a short accelerator belt, which increases their spacing to allow ample room for turning by the automatic rotator bar.

Each carton arriving at the loader is counted by a photo-electric cell, which then signals to the control mechanism the action that loader must take to form that particular carton into the stacking pattern. For example, the carton may be turned 90 deg., or it may ride into the loader unturned.

As soon as a complete row of car-

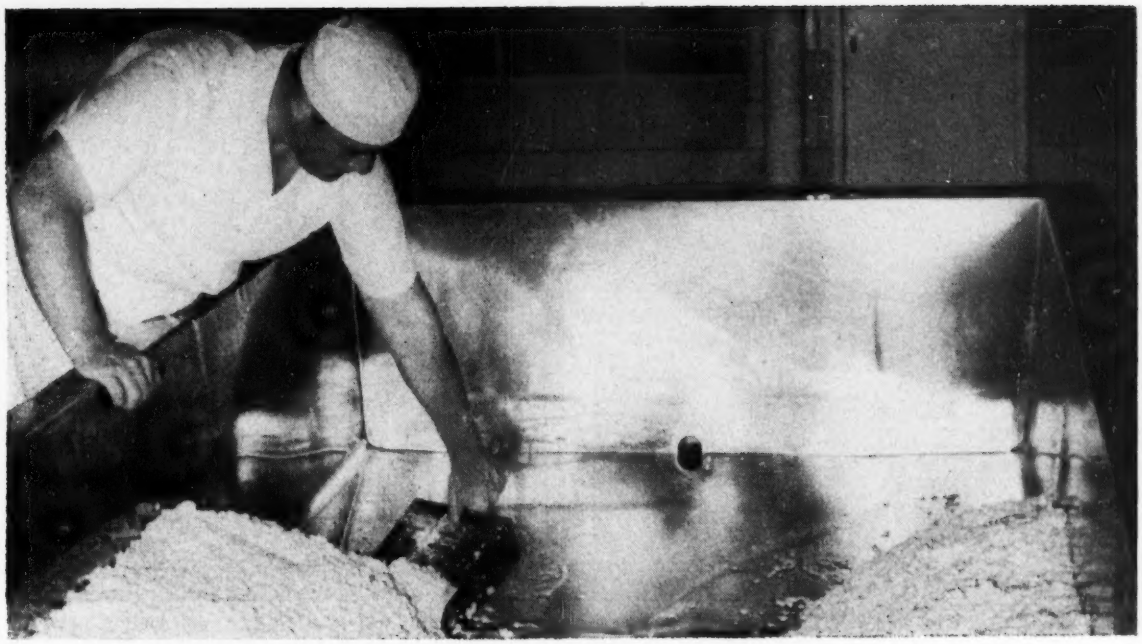
(*Turn to page* 168)




DIRECTION OF STRIPPER PLATE RETRACTION
STRIPPER PLATE
CARTONS BEING DROPPED BY STRIPPER PLATE
UPPER LAYER OF CARTONS ON PALLET

Patterning Scheme and Loader In Action

STABILIZED LOADS are formed by alternate layers that break up all possible vertical lines of cleavage. Right: How unit handles cartons. As each layer is completed, stripper plate retracts, dropping layer onto pallet.



FRESH pleasing flavor is retained, keeping quality improved, when sanitation is practiced all the way.

Fine Points of Sanitation That Up Cottage Cheese Quality

Bacterial spoilage, the major sales deterrent, may be eliminated by careful manufacturing procedures, stringent cleaning and sanitizing of equipment. Control of pH overcomes unfavorable storage conditions

P. R. ELLIKER

Oregon Agricultural Experiment Station, Corvallis, Ore.

Dairy plants that produce cottage cheese of consistently high quality, with fresh flavor and pleasing butter aroma, are finding it one of the most profitable items in their line.

And other plants that have not realized the great sales potential of this product can easily do so—*if they will introduce a few fundamental improvements in manufacturing methods.*

Most important of these involves specific sanitation measures necessary in preventing bacterial contamination of pasteurized milk, cream, and cheese curd.

Other pertinent factors are: (1) Active cultures with full, pleasing butter aroma and flavor; (2) fresh, high grade milk and cream; (3) adequate processing and handling equipment with time-tested procedures for producing desired flavor, texture, and curd size; and (4) a careful laboratory control program as a guide to constant improvement in quality.

Types of Spoilage

First step in improving flavor and keeping quality of commercial cottage cheese is to learn to recognize the common defects and then pin-point the causative factors.

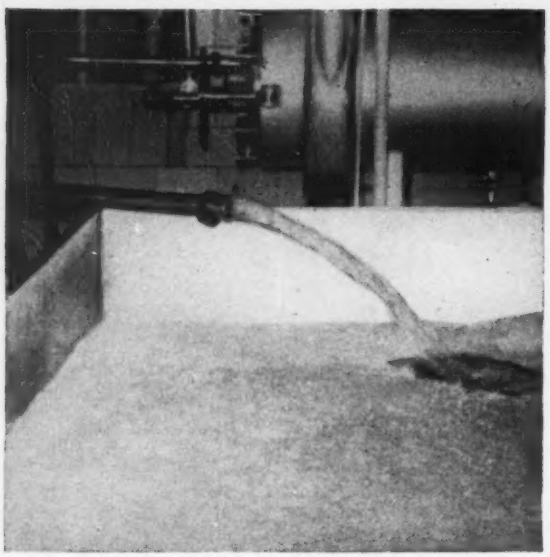
In the case of defects produced by microorganisms this is not difficult. Advanced stages of spoilage by some microorganisms result in physical changes such as slimy, gelatinous, or tapioca curd. These usually are preceded by highly detrimental flavor changes. If such changes are overlooked, the operator may only become alarmed when cheese is returned with the typical slimy, gelatin-like curd.

In many instances the flavor changes that preceded, by a few days, the final physical change in appearance of curd have been enough to permanently discourage the customer from any future purchase of the product.

Yeast and Molds. Discoloration, staleness or moldy flavors are produced by molds which, through their utilization of lactic acid for growth, may raise the pH to a point where spoilage bacteria are able to develop.

Lactose-fermenting yeast commonly causes yeasty, fruity, or acid flavors, and sometimes excessive gas production.

Psychrophilic Bacteria. Most spoilage in cottage cheese in recent years has been by psychrophilic bacteria, which may be defined as those capable of growing at refrigeration temperatures. Few manufacturers have escaped such difficulty. And in many



CHLORINATION (5-10 ppm.) of water used to wash and cool curd, or reconstitute dry milk, eliminates spoilage organisms that frequently enter by this means.

DAILY brushing of vats with warm alkaline solution plus frequent hot soak-washes with caustic solution prevents buildup of protein film.

cases the monetary loss has been very great.

Such spoilage has been accentuated by a number of recent trends. Examples are: Centralization of plants, with greater hauling distances; longer storage before sale; inadequate refrigeration facilities in the retail stores; and the attempt to provide consumers with a low-acid, blander-flavored finished product.

In spite of these factors, however, it is possible to consistently produce cheese that will keep in excellent condition at 50 deg. F. for two weeks.

Loss of Biacetyl. One defect that frequently goes unrecognized by the manufacturer is the flat flavor brought about by bacterial destruction of biacetyl (butter aroma) or lack of its production by the starter. Loss of this pleasant butter aroma robs the product of much of its flavor appeal. Also, it usually precedes more pronounced changes, such as development of fruity, rancid, bitter, and rotten flavors, or physical changes termed slimy, scummy, tapioca, glassy, slick curd, and gelatinous.

Bacteria Responsible For Spoilage

A variety of bacteria have been shown capable of causing spoilage in cottage cheese. Species studied most extensively include:

(A) *Pseudomonas viscosa* that produces a yellowish or brownish-colored slimy film accompanied by flat, bitter or putrid flavor and rotten odor.

(B) *Pseudomonas fragi*, which imparts a fruity odor, a flat, rancid or bitter flavor, and a white gelatinous film on the surface of curd particles.

(C) *Alcaligenes metalcaligenes* that forms a white, gelatinous film like *P. fragi*, but produces little change in odor or flavor.

Studies now in progress should provide information on flavor and physical changes brought about by other species associated with spoilage of cottage cheese. The defects described for the three species listed are fairly representative of what to expect when bacterial spoilage occurs.

How They Enter Product. Soil and water appear to be the most common original sources of the spoilage bacteria. They have been isolated from surge tanks, holding vats, pasteurized milk lines, cottage cheese vats, packaging equipment such as fillers, cans for creaming mixtures, plant and city water supplies, fresh and dried vegetables used for salad cheese, and dust that enters the plant and settles on equipment.

These spoilage bacteria may enter the plant in considerable numbers in raw milk contaminated from dust, soil, water, or utensils on the farm. Studies thus far indicate that they are destroyed by proper pasteurization. Their presence in pasteurized milk equipment suggests that they by-pass the pasteurizer, just as coliform bacteria do when the same tanks, brushes, and washing solutions are used for raw and pasteurized equipment. Also, these bacteria may be carried on hands and clothes of workers.

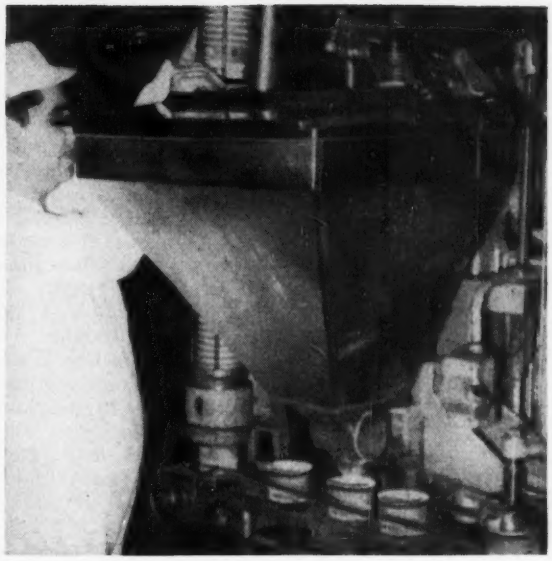
A fact often overlooked is that equipment employed for handling milk, curd, or creaming mixture for cottage cheese requires even more stringent sanitary care than that used for pasteurized fluid milk. Spoilage bacteria accumulate in deposits of milkstone on such equipment and may enter the pasteurized product in large numbers from such sources. Contrary to the opinion of some operators, the cooking received by the curd during manufacture does not eliminate spoilage bacteria.

Fillers and other packaging equipment and cans for dry curd and cream offer no unusual cleaning and sanitizing problem, but importance of their cleansing frequently is underestimated, with resultant accumulation of milkstone and contamination. They can be cleaned by conventional methods with a suitable alkaline detergent.

Some plants subject cans, in particular, to successive daily washings with alkaline and acid cleaners to make certain that all milk deposits are removed. Sanitization should be with an active hypochlorite solution with a minimum concentration of 200 ppm. Cans also may be steamed thoroughly after washing as an added precaution, but this operation should not replace hypochlorite sanitization just before use.

Vats present a special cleaning problem because of the protein film baked on their surfaces during cooking of the curd. This film cannot be removed with acid cleaners since the protein is not soluble in acids as are the minerals.

High-pH alkaline cleaners, well fortified with wetting agent and poly-



CONVENTIONAL cleaning methods, with a suitable alkaline detergent, prevent accumulations of milkstone and contamination on cans used for storage of dry curd and cream, and packaging equipment. Sanitization should be with an active hypochlorite solution containing a minimum 200 ppm. chlorine.

phosphates, are more effective than acids and should be used in a warm solution with vigorous brushing for the daily cleanup. The vat should then be rinsed with hot water and sanitized just before use.

It may be necessary at frequent intervals to employ a hot solution in a soak-wash treatment to remove film accumulated on vat surfaces. The cleaner should, preferably, incorporate some free caustic and, again, be well fortified with wetting agent and polyphosphate. Bottom of the vat should be covered to a depth of a few inches and the hot solution brushed over all of the inside surfaces at frequent intervals until the film is removed. This may require a few hours where the deposit is heavy or deeply embedded in scratches in the equipment.

The knowledge that chlorine attacks protein in milkstone films also may be applied to advantage for cleaning cottage cheese vats.

Addition of 100 to 200 ppm. to alkaline cleaners, or even application of chlorine solutions directly by brushing over the surface of the vats, appears to aid in removal of the protein film.

Because of the disagreeable nature and hazards of cleaning with concentrated chlorine solutions, the alkaline chlorinated cleaner may offer advantages.

Metal sponges still are widely used for cleaning cottage cheese vats. These should be eliminated and replaced with stiff-bristled brushes wherever possible. The metal sponge continually produces deep scratches that immediately fill with new deposits that are extremely difficult to remove and thereby prolong the cleaning time.

One of the most useful sanitation tools for cottage cheese equipment is the ultraviolet light (Black-lite, also known as Mineralite). It is most effective when used by the cleanup crew to examine equipment and cans in a darkened room. Deposits of milkstone readily fluoresce and thus indicate areas where cleaning has not been complete.

Proper Sanitizing a Must

Because of their lower cost as well as other factors, hypochlorites still remain the germicide of choice for sanitization of cottage cheese equipment.

Vats and tanks may be sanitized just before use with 200 ppm. hypochlorite by fogging, spraying, or thoroughly brushing with the solution. Tools should be soaked in this hypochlorite for at least 5 min., and lines should receive an equivalent treatment by pumping the solution through them.

All cans used for dry curd, cream, or creaming mixture should be thoroughly rinsed with 200 ppm. hypochlorite just before use. Similar treatment should be given to all packaging equipment.

Chlorination of Water Supplies has been so successful in eliminating spoilage bacteria entering the plant or product from this source that its routine use in all cottage cheese wash water now is recommended. Usually 5-10 ppm. chlorine, applied either continuously or by batch treatment, should be sufficient to destroy spoilage organisms present.

When continuous injection is employed, the equipment should be designed so as to allow an interval (preferably of 1 min.) for exposure between mixing of chlorine and water and use in the vat. Some operations, however, have been successful with lesser time intervals. Under no circumstances should chlorine be added to the water after it has been run into the vat of curd. For there is no germicide on the market that will destroy spoilage bacteria in the presence of the large amount of organic matter contained in the cheese curd.

Over-chlorination should be avoided for two reasons: (1) The high pH of a more concentrated hypochlorite solution may raise that of the water to the point where the surface of the curd particles assumes a shiny or gelatinous appearance due to neutralization of the casein, and (2) chlorine has a dissolving effect on casein that might promote formation of a gelatinous film on the exterior of the curd particle purely through chemical change.

Growth of iron or other slime bacteria may result in formation of deposits in water lines in the plant. These may support growth of psychrophilic bacteria and protect them from chlorination. The result may be intermittent contamination and spoilage as particles of this material become loosened and are carried into the product with wash water. (*Turn page*)

When there is any indication of such contamination, lines should be disassembled and hand cleaned if so constructed. Otherwise, a hot detergent solution, such as used for in-place cleaning of dairy plant lines, should be circulated through the water lines. This should be followed by a water rinse and circulation of a 200 ppm. chlorine solution.

Where nonfat milk solids are reconstituted with no subsequent pasteurization, water used should be carefully chlorinated in the same manner as the washing or chilling water.

Control of pH in Finished Product

It should be emphasized that the most effective means of preventing spoilage of cottage cheese is to eliminate all psychrophiles, yeast, and molds from the product by proper sanitary measures.

On the other hand, personal observation has demonstrated time and again that some manufacturers can save themselves much grief and increase keeping quality and sales by a combination of plant sanitation and intelligent pH control. In fact every cottage cheese operator should equip his plant or control laboratory with a dependable pH meter and train someone to operate it properly in order to follow this important factor even though no attempt is made to lower final pH levels.

Laboratory studies, in which dry curd was adjusted to various pH levels and inoculated with dilutions of milk cultures of different types of spoilage bacteria, demonstrated some variation in pH tolerance of the bacteria. When curd so inoculated was incubated at 59 deg. F. for 72 hr., no visible spoilage was produced by any of the bacteria at pH 4.8; P. viscosa produced a slimy film at pH 5.0; and all did at pH 5.2.

It is possible that all of the organisms may have developed to some extent at lower pH levels and might have produced visible spoilage over a longer incubation period.

These studies emphasized a significant fact that has been borne out frequently in commercial operations—that an adjustment in final pH of 0.1 to 0.2 units may be critical in delaying growth of spoilage organisms. Where pH control is employed to inhibit spoilage, final level should be in the vicinity of 5.0. Rapid bacterial growth occurs at higher levels, and when pH drops appreciably below 5.0 in the finished product a pronounced acid flavor results.

There are several methods for regulating pH of finished cheese, and each has its advantages and disadvantages. The pH of dry curd, and subsequently of the finished product, is in part dependent on composition of milk, cutting acidity, size of curd particles, number of washings, and alkalinity of washing and chilling water.

Several Methods Available

Little latitude is offered in cutting acidity in order to provide desired texture consistently from day to day. Excessive washing should be avoided because it removes too much acid and flavor from the curd. If a water supply is highly alkaline, pH adjustment of the wash and chilling water may be desirable.

In limited studies on pH levels encountered in commercial cheese it was shown that curd cut at 0.55-0.58% titratable acidity yielded dry curd with pH levels of 4.65-4.75. Following creaming, the same samples ranged from pH 4.85 to 5.05. Average increase in pH of curd due to creaming was about 0.2 to 0.4 pH units. However, cottage cheese from many plants cutting at about 0.50 to 0.55% acid may range as high as pH 5.2-5.3.

A fairly common pH control method is to add butter culture to the creaming mixture. If the inoculated cream is allowed to ripen slightly, a lower pH results in the final product. In some instances cultured cream also enhances the aroma and flavor of the finished cheese.

One important disadvantage of this measure, however, is the danger of excessive acid development. This occurs when storage temperatures during shipment, sale, or even in the home, become too high and allow growth of the lactic acid bacteria. For example, many store cabinets do not maintain all of the cheese below 50 deg. F. and considerable acid may be produced in a few days under this condition.

Easiest means for pH control in the finished product is direct acidification of cream by an acid such as citric. Uniform control can be maintained daily in this manner. Disadvantages are the slight acid flavor contributed by citric acid and the fact that some state and Federal standards do not approve such additions.

Where difficulty is encountered with alkaline water another control method is applicable. Such water may be acidified to the desired level by addition of citric or phosphoric acid either on a batch or continuous basis. This procedure should be carried out carefully because it may change the physical properties of the curd. It does lower the pH of the dry curd slightly and thus of the finished product as well.

Increasing salt content of finished cheese has been suggested as a means of controlling bacterial spoilage. However, laboratory studies and practical observations have demonstrated this measure to be ineffective. Salt required to prevent spoilage bacteria is far above the 1% level representing the maximum many consumers will tolerate.

Cooling and Refrigeration. Rate of growth of spoilage bacteria and yeasts can be retarded markedly by chilling the curd to as low a temperature as possible and then cooling it further in storage after removal from the vat. In general, the defects develop slowly at 40 deg. F. or lower, but spoilage occurs rapidly at 50 to 60 deg.

Curd should be chilled, if possible, to 40-42 deg. in the vat and then gradually cooled to less than 40 deg. F. in subsequent storage. Use of chilled cans and immediate transfer of curd from vat to cold storage rooms often avoid undesirable increases in temperature. Long holding periods at room temperature during packaging also should be shunned.

Keeping-Quality Tests are an absolute necessity for every cottage cheese manufacturer. They should be carried out daily on both dry and creamed curd and, if possible, at two different temperatures, for example 50 and 70 deg. F.

These temperatures are suggested because 50 F. provides conditions more closely approximating transport, storage, and marketing, while 70 F. affords an accelerated test that often indicates within 48 hr. those lots that have poor keeping quality. The latter often can be picked up from retail outlets before spoilage occurs.

Some plants also set aside samples of the creaming mixture and test them for flavor and development of spoilage bacteria. In keeping-quality checks, samples should be tested regularly for odor, flavor, texture, and physical appearance. Samples picked up at random from retail outlets also should be gaged in this manner regularly to acquaint the operator with condition of his product on the market.

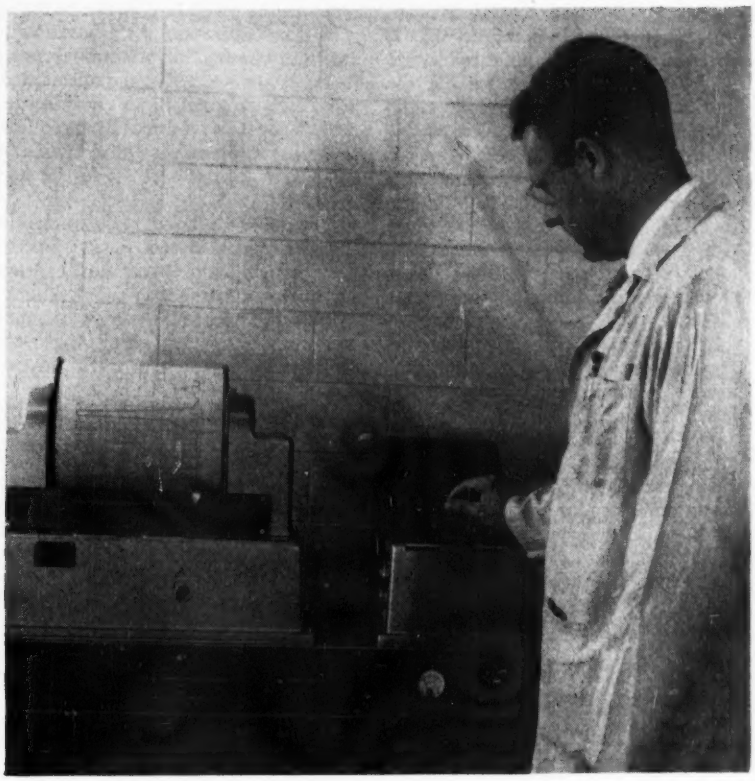
Detection of Spoilage Organisms

Yeasts and molds can be detected readily by plating products on a special medium, such as acidified potato dextrose agar. Spoilage bacteria can be isolated by plating on the same agar used for standard milk counts. Growth is especially abundant on such special agars as veal or beef infusion. Other agars such as violet red bile and agar containing added penicillin permit growth of most spoilage bacteria while restricting many other types. Thus, these provide useful selective media.

Water supplies may be tested by

(*Turn to page* 200)

SPECTROPHOTOMETRIC CURVES have provided much data pertinent to improvement of dry flavors and control of their quality. By employing different methods in preparing them, then running curves on the powdered flavors, it was possible to determine the quantity of flavoring ingredients lost during processing. And by testing the powders at intervals, their shelf lives were indicated.



Blazing The Trail To . . .

Superior Powdered Flavors

Their coatings must have low melting points with high solubility, yet form solid capsules around flavor oils . . . Spectrophotometer invaluable for checks

JAMES J. BRODERICK
Flavor Chemist, Givaudan Flavors Inc., New York City

There has always been a need for flavors in a powdered form. But until quite recently, really satisfactory and versatile commercial products were not available.

We will detail here how the difficulties have been surmounted and the goal approached.

Many of the original products were simple mixtures of flavor oils adsorbed on dextrose or some other carrier, and they were subject to the same conditions of evaporation, oxidation, polymerization, etc., as the liquid flavors mixed into the powdered food product.

Whereas stable, satisfactory powdered products were made with vanilla, chocolate, and maple flavors in this manner, those with other flavors were very inferior.

In 1945, a patent was obtained for use of gelatin (and related colloids) to seal in flavor oils.* This method was reasonably effective, but its use was limited due to physical properties and cost of the gelatin.

In more recent years, interest was revived in powdered flavors by the introduction of sorbitol as a coating material for the flavor oil.** This product has the unique property of automatically forming a coating around oil particles when in an essentially nonaqueous molten form. It proved to be much more effective than previous materials.

Use of sorbitol alone has definite disadvantages, however. In the above mentioned process it is necessary to disperse flavor oil in the super-cooled, *molten* product. Temperature attained in commercial size batches is sufficiently high to damage many delicate flavors. For large scale production, some specialized equipment would have to be devised to insure proper emulsification of the flavor oil and control particle size. Although an effective humectant, sorbitol will crystallize under certain shelf conditions and allow the flavor oil to escape.

This coating material is cheaper and more soluble than gelatin or gum arabic and offers adequate flavor protection under certain controlled conditions. However, we have yet to see a really practical commercial product developed using sorbitol *alone*.

Spray Drying Effective

Most popular and effective powdered flavor on the market today is spray dried, with a vegetable gum base, usually gum arabic (acacia). It offers many advantages that were lacking in previous products. The gum is less expensive than gelatin (although slightly higher than sorbitol), is reasonably soluble, is amorphous and therefore does not crystallize, and the

*Olsen, A. G., and Seltzer, E., U. S. Patent 2,369,849, 1945 (to General Foods Corp.).
**Griffin, W. C., U. S. Patent 2,566,410, 1952 (to Atlas Powder Co.).

powder can be prepared by an effective commercial process—spray drying.

Before drying, the oil droplet size can be rigidly controlled so that the final product is essentially a solid emulsion. Amount of oil in finished product will vary with the strength of oil, and quantities of sugars or other materials added to adjust flavor strength. Maximum amount of oil will vary with droplet size, also coating thickness. To date, we have not seen an effective powder containing more than 10% oil.

In the spray-dried vegetable-gum-based flavors, particle size of finished powder is usually quite small and exposed surface, therefore, relatively large. Also, heat of processing, plus entrapped oxygen, can cause oxidation within the coated particle, with subsequent development of additional off-tastes.

Percentage of oxidized oil can be relatively small and yet effectively spoil the flavor of the finished product. By removing the surface oil with a solvent, a much more stable product is obtained, but the processing cost is, unfortunately, increased.

Other drawbacks associated with spray dried gum coated flavors are:

1. In certain media, such as gelatin desserts, the amount of insoluble gum that must be added to assure sufficient flavor will result in a cloudy finished dessert. It is possible to make most flavors strong enough to prevent clouding, but solubility limitations make it difficult to incorporate some type flavors.

2. In preparing cold water drink powders, the gum is more slowly soluble than the sugars and other materials in the powder and accordingly longer stirring is required to obtain a clear solution. Unless concentrated flavors are used, cloudy or hazy finished drinks that are physically unstable are obtained.

3. In some cases, the particles of gum-based flavors, being very fine, also create packaging problems due to their tendency to settle out in the package.

With a realization of the advantages and shortcomings of present-day powdered flavors, we at Givaudan initiated a research program in an effort to develop a superior product. First requirement was to prepare a stable flavor at a price that did not place it in the luxury class.

We made a unique application of a popular analytical tool in the process development, and it was further used for quality control after development: Ultra-violet spectrophotometric curves were run on the flavoring oils that were to be protected by the processing.

Cold Process Envisioned

By using various methods of processing and then determining the characteristic curves after processing, it was not only possible to determine quantity of flavor ingredients lost, but also to note any changes in these ingredients. Thus, we learned that the gum arabic spray-dried product was extremely stable, whereas the 100% sorbitol product showed a gradual loss of flavor ingredients.

We also discovered that losses during spray drying were considerable, and that the lighter boiling and water-soluble flavor ingredients were almost completely lost. And the heat of the process was found to be detrimental to the quality of some flavoring materials, especially the citrus oils. We, therefore, concluded that an essentially cold process was necessary for maximum flavor stability.

By removal of excess moisture at 68-86 deg. F., the flavoring materials were unaffected. By checking the ultraviolet spectrometric curves it was shown that, at this temperature, the only losses or changes in flavoring materials were in the small percentages of surface oil.

Loss of flavor after processing was shown to vary directly with amount of exposed surface (*i.e.*, loss or oxidation of surface oil), so it was concluded that controlled particle size was desirable. Therefore we recommend the largest particle size compatible with the finished food product in which the flavor is to be incorporated.

Utility of the analytical curves is demonstrated in the above discussion and their application in problems of this type is increasing in our organization. Standard curves have been set up for a large number of flavors, and commercial batches are now readily checked against these standards. As a double check, the finished flavor is tested for quality, strength, and consistency.

Our research indicated the need for a new means of producing citrus flavors in a highly concentrated form while retaining the freshness of the original oil. Blending natural oils from various producing areas was the first important step, followed by extraction with a combination of solvents. Coupled with cold processing, this has eliminated the off-flavors so prevalent in *natural* citrus powdered flavors.

Combined Coating Lowers Cost

Our greatest success was obtained, however, in reducing costs. Process and equipment were engineered that enabled economies, yet allowed flexibility of production.

We found that some gum arabic, combined with other natural extractives, gave us the final stability desirable in these powdered products. And by limiting them to a small proportion of the total product, we were able to eliminate the previously mentioned solubility disadvantages.

The unique humectant and coating properties of sorbitol were found useful when used as a minor proportion of the final product. The economy, solubility and compatibility desired were supplied by dextrose, which alone is ineffective, but which in the proper combination proved to be the desired bulk item. These products were combined and processed in such manner that the amount of surface exposed was held to a bare minimum.

Only flavors in their most highly concentrated state (minus solvents and inert ingredients) were used, thus insuring maximum efficiency and minimizing quantity of the relatively expensive coating materials.

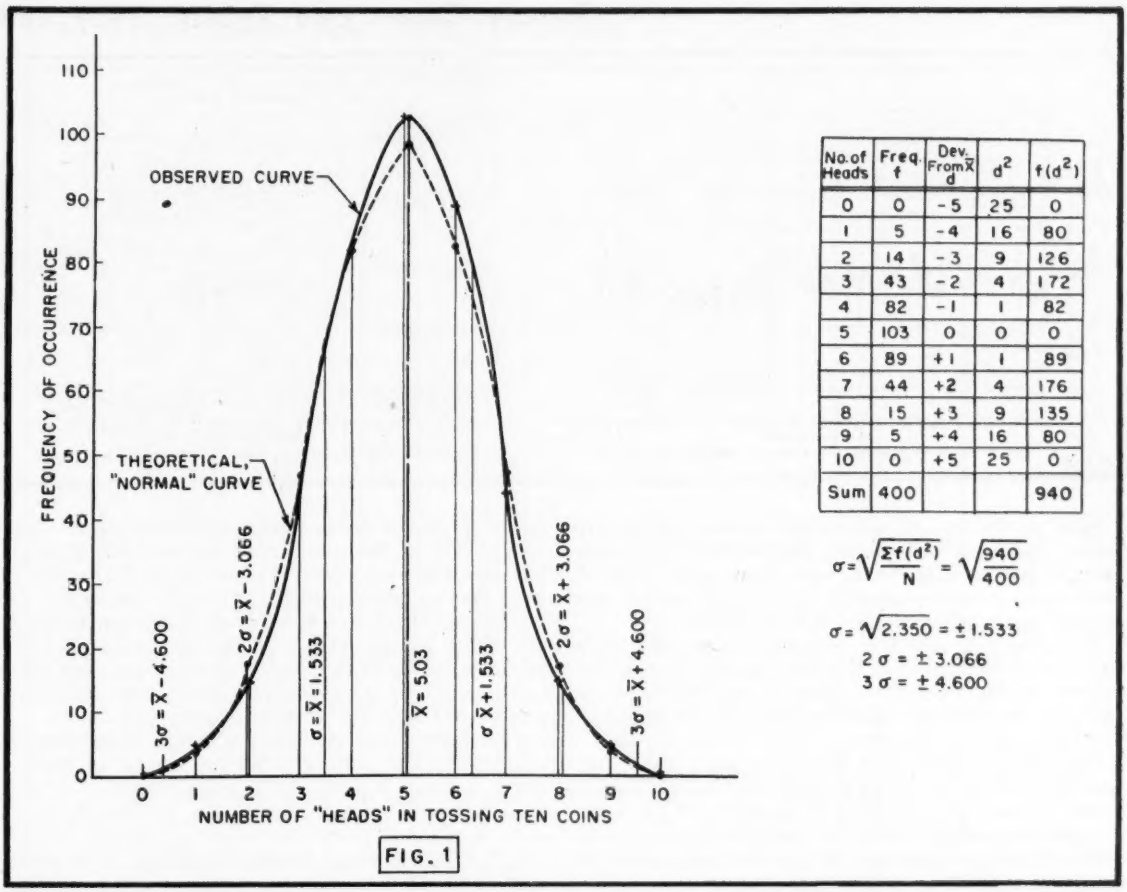
More than two years of research in our flavor, research, and analytical laboratories were necessary before we felt our goal of stable powdered products at the price of liquid flavors was reached. This program reflects the dynamic nature of the flavor business. Even now, in our own and other laboratories, research programs are going on to further improve these and other flavor products.

POWDERED FLAVORS and Recommended Quantities for Use (Per 100 lb. of Mix) in Several Dry Foods

(Also adaptable[1] or cake mixes, instant icings and frostings, powdered ice cream and sherbet mixes, tablets, and other flavored products sold in powdered form)

Flavor	Gelatin Dessert Powder[1] (Ounces)	Puddings or Pie Fillings[2] (Ounces)	Summer Drink Powders[3] (Pounds)	Milk Powders[4] (Ounces)
Cherry crystals F-1499 (imitation)	3½–4	....	2½–3	24
Coconut crystals F-1500 (imitation)	....	4	....	12–16
Grape crystals F-1501 (imitation)	3	....	2–3	....
Lemon flavored crystals F-1498	2–3	4–6	1–1½	12–16
Lime flavored crystals F-1464	2–3	....	1	12–16
Pineapple crystals F-1502 (imitation)	1½–2	....	¾–1	....
Raspberry crystals F-1538 (imitation)	¾–1	....	9/16	4
Strawberry crystals F-1466 (imitation)	1½–2	....	1	8
Vanilla crystals F-1590 (imitation)	....	6	....	16
Vanilla crystals F-1586 (imitation)	....	6	....	12–16

[1] Use 3 oz. per pt. of water.
[2] Use 4 oz. per pt. of milk.
[3] Use 1 oz. to 2 qt. water.
[4] Use ½ oz. to 8 gal. milk.


OBSERVED CURVE
THEORETICAL, "NORMAL" CURVE
FREQUENCY OF OCCURRENCE
NUMBER OF "HEADS" IN TOSSING TEN COINS
3σ = X̄ − 4.600
2σ = X̄ − 3.066
σ = X̄ − 1.533
X̄ = 5.03
σ X̄ + 1.533
2σ = X̄ + 3.066
3σ = X̄ + 4.600

No. of Heads	Freq. f	Dev. From X̄ d	d^2	$f(d^2)$
0	0	−5	25	0
1	5	−4	16	80
2	14	−3	9	126
3	43	−2	4	172
4	82	−1	1	82
5	103	0	0	0
6	89	+1	1	89
7	44	+2	4	176
8	15	+3	9	135
9	5	+4	16	80
10	0	+5	25	0
Sum	400			940

$$\sigma = \sqrt{\frac{\Sigma f(d^2)}{N}} = \sqrt{\frac{940}{400}}$$

$$\sigma = \sqrt{2.350} = \pm 1.533$$

$$2\sigma = \pm 3.066$$

$$3\sigma = \pm 4.600$$

FIG. 1

PROBABILITY LAWS have an effect on the weighing process. This curve, based on number of appearances of heads when tossing ten coins, illustrates frequency distribution. If, in weighings, scale readings are not within tolerances of normal frequency distribution, then need for adjustment is indicated.

Keep Your Weighing Accurate

The Control-Chart Way

Graph system provides a reliable means for determining precision of your automatic scales... How the check-charts are made and employed . . . Theory behind them detailed

JOHN K. JUDD
Chief Research & Applications Engineer, Richardson Scale Co., Clifton, N. J.

Your processing cannot be truly efficient unless your automatic scales are accurately adjusted. A dependable means for determining their exactness is, therefore, essential.

Quality control charts can provide this need, and so they are being employed by more and more processors to keep scales "on the beam".

Here's the method of making and using such charts. But first let us discuss the fundamentals—statistical quality control, probability, and deviation.

1—Statistical Quality Control

We can define, with mathematical certainty, the inherent variations in any process. We can also precisely identify the limits of variation that can be tolerated without exceeding the specified process requirements.

When this has been done we may set down and later maintain a standard of quality for the process. We can, for instance, signal an immediate warning whenever established limits are exceeded.

How obtain this control? We start by collecting quantitative data, and then analyzing it, applying sound, proved statistical techniques. This process of collection and statistical analysis of data to regulate quality is *statistical quality control.*

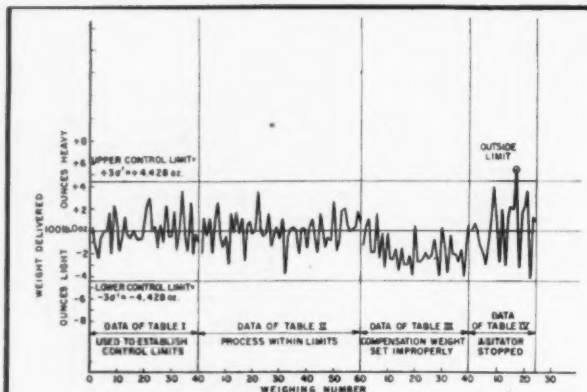
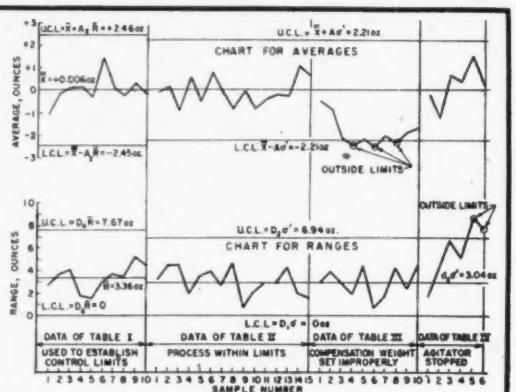


CHART FOR INDIVIDUAL WEIGHINGS, 100 LB DRAFTS – HIGH SPEED POULTRY MASH

FIG. 2



PROCESS CONTROL CHARTS, 100 LB. DRAFTS – HIGH SPEED POULTRY MASH

FIG. 3

Based on the laws of probability—familiar both in calculating insurance and playing poker—statistical quality control has a heritage dating back many years. Only in recent times, however, has the science been developed and accepted as a reliable means of process control.

In dealing with automatic weighing, we are particularly interested in two phases of this type of control. The first involves finding out how accurate a particular scale is. Second is to determine whether this accuracy is within the requirements of the process.

Naturally, we must know what precision a given scale can deliver before we can tell if it will meet specific requirements. This is not as simple as it sounds, for the accuracy is influenced in large measure by the characteristics of the material being weighed and by the size and uniformity of the stream admitted to the weigh hopper.

2—Fundamentals of Probability

The laws of probability will have an effect on any operation. When not influenced by some outside source, the effect of probability can be readily seen. For example, in tossing a coin 100 times anyone would expect the number of heads and the number of tails to be about the same—if the coin is normal and is tossed in the same way each time.

It's similar with dice. In a roll of one die, chances of a 2 are 1 in 6—if the die is normal. But if the die is loaded (an example of influence by an outside source), the law of chance, or probability, is no longer the controlling factor. These are examples that are so easily understood that we take them for granted.

Suppose now, we take ten coins and toss them one at a time. We will get a certain number of heads and this number could be anything from 0 to 10. But if we repeat our tossing of the ten coins 400 times, we begin to get a good picture of how the laws of probability affect an operation. Common sense tells us that with this number of tosses we should get five heads and five tails more often, but it is more difficult to say exactly how many times we can expect to get, say, three heads or nine heads.

When we actually made the 400 tosses, we got five heads 103 times (see table beside graph in Fig. 1). There were progressively fewer cases of four or six heads, three or seven, two or eight, and one or nine heads, and there were no cases of none or ten heads.

Plotting the frequency of occurrence against the number of heads observed gave us the graph seen in Fig. 1. It is very nearly symmetrical.

This curve is called a frequency distribution and is typical of the variations caused by chance alone. What does probability theory tell us? It was said that in tossing ten coins 400 times we would expect to get five heads more often than any other number. We would also expect that the average number of heads in all 400 tosses would be five (actual average obtained in the experiment was 5.03). Naturally, the larger the number of tosses, the more nearly the average will approach 5.00 until, with an infinite number of tosses, the average would be 5.00.

Probability theory can also tell us how many times we could theoretically expect to get any number of heads in our coin-tossing experiment, and this theoretical number is plotted as the dotted curve in Fig. 1. This theoretical curve is called a "probability curve" or "normal distribution." It is important because it permits us to predict mathematically how often a given event may be expected to occur due to chance alone.

In analyzing data from a test we can determine how often a given reading would occur by chance. If its actual frequency of occurrence is vastly different from the theoretical occurrence we can safely conclude the reading could not have been merely by chance and must have had findable cause for its occurrence.

3—Standard Deviation

An arithmetic average tells us much but does not show how readings vary among themselves. A measure of dispersion, or variation, is therefore of considerable aid because it does just this.

The measure of dispersion that has been most widely used in statistical analysis is the "standard deviation," designated by the Greek letter sigma, σ. The standard deviation of a set of N number of readings is defined mathematically as the square root of the sum of the squares of individual deviations divided by the number of readings, or symbolically:

$$\sigma = \sqrt{\frac{\Sigma\,(d^2)}{N}}$$

Standard deviation is a most useful tool. It can be shown that, when the variation of readings is due to chance, 68% of the readings will lie between plus and minus σ from the average. Of these readings 95% will lie between plus and minus 2σ from the average, and 99.7% will lie between plus and minus 3σ. This fact is illustrated in Fig. 1.

With this information, we can predict whether a given process will meet specified tolerance limits. It can also warn us before the limits are actually exceeded in a running

TABLE I

WEIGH NO.	WEIGHT ERROR IN HOPPER (OUNCES) HEAVY	LIGHT	DEVIATION FROM AVERAGE d (OUNCES)	d^2	SAMPLE NO.	SAMPLE AVERAGE $\bar{X}$ (OUNCES)	SAMPLE RANGE R (OUNCES)
1	1/4		+0.244	0.0595			
2		1 1/4	-1.256	1.5775	1	-1.063	2.750
3		2 1/2	-2.506	6.2800			
4		3/4	-0.756	0.5715			
5		1/8	-0.131	0.0172			
6	0	0	-0.006	0.0000	2	-0.125	3.625
7	1 5/8		+1.619	2.6212			
8		2	-2.006	4.0240			
9	2 1/4		+2.244	5.0355			
10	3/8		+0.369	0.1362	3	+0.094	4.000
11		1 3/4	-1.756	3.0835			
12		1/2	-0.506	0.2560			
13	1 1/4		+1.244	2.7915			
14		1/4	-0.256	0.0655	4	+0.125	1.750
15		1/2	-0.506	0.2560			
16	0	0	-0.006	0.0000			
17		1/2	-0.506	0.2560			
18		3/4	-0.756	0.5715	5	-0.313	1.500
19		3/4	-0.756	0.5715			
20	3/4		+0.744	0.5536			
21	2 1/4		+2.244	5.0355			
22	3		+2.994	8.9640	6	+1.406	3.000
23	0	0	-0.006	0.0000			
24	3/8		-0.369	0.1362			
25		1 1/2	-1.506	2.2680			
26	1/2		+0.494	0.2440	7	+0.063	3.750
27		1	-1.006	1.0120			
28	2 1/4		+2.244	5.0355			
29		1/2	-0.506	0.2560			
30		1/2	-0.506	0.2560	8	-0.250	3.500
31	1 3/4		+1.744	3.0415			
32		1 3/4	-1.756	3.0835			
33	0	0	-0.006	0.0000			
34	3 1/2		+3.494	12.2080	9	+0.313	5.250
35		1/2	-0.506	0.2560			
36		1 3/4	-1.756	3.0835			
37	2 1/2		+2.494	6.2200			
38		2	-2.006	4.0240	10	-0.188	4.500
39		1/4	-0.256	0.0655			
40		1	-1.006	1.0120			
SUM	22 5/8	22 3/8		84.9289		+0.062	33.625

AVG. WT. ERROR; $\bar{X} = +\frac{0.25}{40} = +0.006$ oz. $\sigma = \sqrt{\frac{84.9289}{40}}$; $\sigma_1 = \pm 1.457$ oz. $\sigma' = \pm 1.476$ oz.

$\bar{X}_{III} = 0.006$ oz. $\bar{R} = 3.363$ oz.

TABLE III

COMP. WEIGHT SET IMPROPERLY

WEIGH NO.	WEIGHT ERROR IN HOPPER (OUNCES) HEAVY	LIGHT	SAMPLE NO.	SAMPLE AVERAGE $\bar{X}$ (OUNCES)	SAMPLE RANGE R (OUNCES)
1		1 1/4			
2	1/4		1	-0.500	3.000
3	1				
4		2			
5		2			
6	1 1/2		2	-0.813	4.000
7		2 1/2			
8		1/4			
9		3 1/4			
10		1/4	3	-2.125	3.000
11		2 1/2			
12		2 1/2			
13		1 5/8			
14		3 1/2	4	-2.406	2.000
15		1 1/2			
16		3			
17		3			
18		2 1/4	5	-2.188	4.500
19		4			
20	1/2				
21		2 3/4			
22		2 3/4	6	-2.500	0.750
23		2 1/2			
24		2			
25		2 1/2			
26		2 1/4	7	-2.000	1.750
27		3/4			
28		2 1/2			
29		4			
30	1/4		8	-2.281	4.250
31		1 5/8			
32		3 3/4			
33		3/8			
34		2	9	-1.813	2.375
35		2 1/8			
36		2 3/4			
37		1 3/4			
38		4	10	-1.625	4.500
39		1 1/4			
40	1/2				

TABLE IV

AGITATOR STOPPED

WEIGH NO.	WEIGHT ERROR IN HOPPER (OUNCES) HEAVY	LIGHT	SAMPLE NO.	SAMPLE AVERAGE $\bar{X}$ (OUNCES)	SAMPLE RANGE R (OUNCES)
1	0	0			
2	1/2		1	-0.188	1.750
3	0	0			
4		1 1/4			
5		2			
6		3	2	-1.219	4.125
7		1			
8	1 1/8				
9	4				
10		1/4	3	+0.719	6.750
11		2 3/4			
12	1 7/8				
13		3 1/8			
14	1		4	+0.469	5.250
15	2 1/8				
16	1 7/8				
17	5 1/2				
18		3 1/4	5	+1.531	8.750
15	1 5/8				
20	2 1/4				
21	3 1/2				
22		4 1/4	6	+0.281	7.750
23	1 1/8				
24	3/4				

TABLE II

WEIGH NO.	WEIGHT ERROR IN HOPPER (OUNCES) HEAVY	LIGHT	SAMPLE NO.	SAMPLE AVERAGE X (OUNCES)	SAMPLE RANGE R (OUNCES)
1		2			
2	1 1/4		1	-0.063	3.250
3		1/2			
4	1				
5		2			
6	3/4		2	+0.188	4.500
7	2 1/2				
8		1/2			
9		1 1/2			
10		1/2	3	-0.875	4.500
11		3			
12	1 1/2				
13		1/8			
14	1 5/8		4	+0.563	1.875
15		1/4			
16	1				
17		2 3/4			
18	1/2		5	-0.500	3.500
19	3/4				
20		1/2			
21	0	0			
22	3 1/2		6	+0.781	4.000
23	1/8				
24		1/2			
25		1/8			
26	1 1/2		7	-0.094	2.875
27		1 3/8			
28		3/8			
29	1/4				
30		5/8	8	-0.781	4.750
31	1				
32		3 3/4			

WEIGH NO.	WEIGHT ERROR IN HOPPER (OUNCES) HEAVY	LIGHT	SAMPLE NO.	SAMPLE AVERAGE X (OUNCES)	SAMPLE RANGE R (OUNCES)
33		1/2			
34	1/8		9	0.000	0.750
35	1/4				
36	1/8				
37		2			
38	1/8		10	-0.781	2.175
39	1/8				
40		1 1/2			
41	1/8				
42	1		11	-0.375	3.000
43		5/8			
44		2			
45	1 1/2				
46		1/8	12	-0.188	3.000
47		1 1/2			
48		5/8			
49		7/8			
50	2 5/8		13	-0.250	4.375
51		1 3/4			
52		1			
53	1 3/4				
54	2		14	+1.063	2.000
55	1/2				
56	0	0			
57	1/8				
58	1/4		15	+0.688	1.625
59	1 5/8				
60	3/4				

DATA TAKEN 1 MONTH AFTER TABLE I

TABLE V

SHEWHART CHARTS FOR AVERAGES

NUMBER OF OBSERVATIONS IN SAMPLE n	CONSTANTS FOR COMPUTING CONTROL LIMIT FOR AVERAGE AND RANGE TO SEE IF AN UNKNOWN PROCESS IS IN CONTROL: FACTOR FOR $\bar{X}$ CHART A_2	FACTORS FOR R CHART: LOWER CONTROL LIMIT D_3	FACTORS FOR R CHART: UPPER CONTROL LIMIT D_4	CONSTANTS FOR COMPUTING LIMIT LINES TO DETERMINE IF A KNOWN PROCESS REMAINS IN CONTROL: CHART FOR AVERAGES: CONSTANT FOR CONTROL LIMITS $A(=3/\sqrt{n})$	CHART FOR RANGES: CONSTANT FOR CENTRAL LINE d_2	CHART FOR RANGES: CONSTANTS FOR CONTROL LIMITS D_1	CHART FOR RANGES: CONSTANTS FOR CONTROL LIMITS D_2
2	1.88	0	3.27	2.12	1.13	0	3.69
3	1.02	0	2.57	1.73	1.69	0	4.36
4	0.73	0	2.28	1.50	2.06	0	4.70
5	0.58	0	2.11	1.34	2.33	0	4.92
6	0.48	0	2.00	1.22	2.53	0	5.08
7	0.42	0.08	1.92	1.13	2.70	0.20	5.20
8	0.37	0.14	1.86	1.06	2.85	0.39	5.31
9	0.34	0.18	1.82	1.00	2.97	0.55	5.39
10	0.31	0.22	1.78	0.95	3.08	0.69	5.47
11	0.29	0.26	1.74	0.90	3.17	0.81	5.53
12	0.27	0.28	1.72	0.87	3.26	0.92	5.59
13	0.25	0.31	1.69	0.83	3.34	1.03	5.65
14	0.24	0.33	1.69	0.80	3.41	1.12	5.69
15	0.22	0.35	1.65	0.77	3.47	1.21	5.74
16	0.21	0.36	1.64	0.75	3.53	1.28	5.78
17	0.20	0.38	1.62	0.73	3.59	1.36	5.82
18	0.19	0.39	1.61	0.71	3.64	1.43	5.85
19	0.19	0.40	1.60	0.69	3.69	1.49	5.89
20	0.18	0.41	1.59	0.67	3.74	1.54	5.92
	CHART FOR AVERAGES: CENTRAL LINE IS AT $\bar{\bar{X}}$; UCL = $\bar{\bar{X}} + A_2\bar{R}$; LCL = $\bar{\bar{X}} - A_2\bar{R}$. CHART FOR RANGES: CENTRAL LINE IS AT $\bar{R}$; UCL = $D_4\bar{R}$; LCL = $D_3\bar{R}$.			CHART FOR AVERAGES: CENTRAL LINE IS AT $\bar{\bar{X}}$; UCL = $\bar{\bar{X}} + A\sigma'$; LCL = $\bar{\bar{X}} - A\sigma'$. CHART FOR RANGES: CENTRAL LINE = $d_2\sigma'$; UCL = $D_2\sigma'$; LCL = $D_1\sigma'$. (σ' = EXPECTED VALUE OF σ)			

process. To explain: A study is made of the process, with 25 or more successive readings taken. We then calculate the average reading and the standard deviation. We know that there are only three chances in a thousand that any reading will fall outside the limits of plus or minus 3σ from the average due to chance.

If these readings are within the tolerances permitted for the process, we can say that the process is capable of meeting the desired limits. If, now, we take a small group of sample readings of the process from time to time and find that each reading is within our previously calculated 3σ values, then the process is still operating satisfactorily.

If any readings fall outside our 3σ limits we know either that the new variations are caused by something other than chance, or that the process average has shifted. We may then take steps to find the cause. If the permissible tolerances for the process are broader than the 3σ limits, we are in a position to make corrective adjustments well before the process has actually produced unacceptable results. As stated, any process or operation is subject to

the laws of probability, and this is just as true of weighing as it is of tossing a coin. We know that, if we have an automatic scale properly adjusted, we will not always weigh out the exact-same amount of material on successive weighings. Some run slightly heavy and others light. As long as the scale is operating correctly, these variations may be considered due to chance. A record of a large number of them would produce a curve similar to Fig. 1.

Let's consider an actual case of an automatic bagging scale making 100-lb. weighings of poultry mash at high speed. Forty test weighings were taken and each measured to the nearest $\frac{1}{8}$ oz., with results as shown in Table I. The average weighing was 0.006 oz. heavy, but individual weighings differed from the average as much as $3\frac{1}{4}$ oz.

Our problem is to determine the accuracy of this scale and make up a control chart. With this we may then detect whether the accuracy is being maintained continually. There are three steps in making up such a chart.

Step 1—Determining the standard deviation of *individual* weighings: In Table I are listed the deviations from the average and the squares of the deviations. From this, σ is determined by Equation (1) for the 40 test weighings observed. To make it more general . . .

$$\sigma^1 = \sigma \sqrt{\frac{N}{N-1}}$$

in which σ is the standard deviation of the sample of N number of readings and σ^1 is the expected or theoretical standard deviation which would result in taking an infinitely large sample from the same "population."

It develops that σ^1 is 1.48 oz. Therefore, by chance alone, any individual weighing will not differ from the average by more than thrice this, or 4.44 oz., more often than three times in a thousand weighings.

The 40 individual weighings observed in our test have been plotted on the left in Fig. 2, with the limit lines at plus and minus $3\sigma^1$ (4.44 oz.) drawn in.

If we extend these limit lines and plot additional weighings, values should fall within the limit lines as long as the process remains in control. When points appear beyond these limits, the scale needs adjustment. Either the weighings are erratic or they are no longer averaging the correct weight.

We tested the same scale a month after the initial study. Table II was made. These points were plotted in Fig. 2, and the limit lines, established from the first test, extended. Note that all 60 weighings fall well within the limits of plus or minus $3\sigma^1$ and seem to oscillate uniformly about the desired 100-lb. value. This shows that the scale is still operating in a state of good control.

To illustrate the sensitivity of statistical control charts in detecting abnormal conditions, further data were taken. In Table III the compensation weight (governing the

(*Turn to page 204*)

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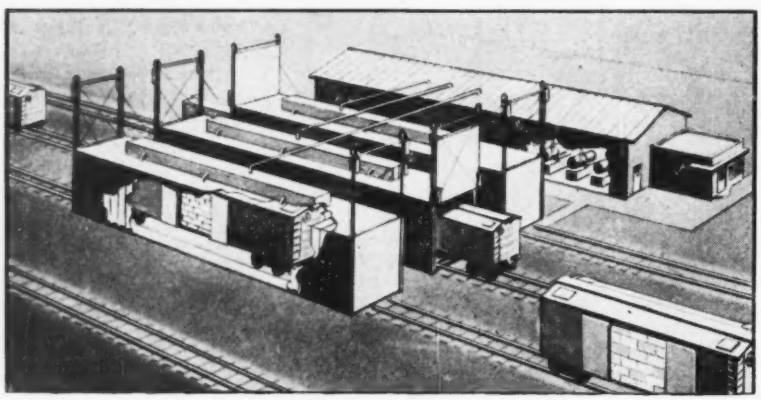


Cools Produce 'by the Car'

Cutting Labor, Handling, Time

FE STAFF

Fully loaded refrigerated rail cars of lettuce are now cooled to 33 deg. F. in only 20-25 min. at Goetz Ice Co.'s plant, Tolleson, Ariz.

The new setup, utilizing oversize vacuum chambers served by the Gay-vac precooling system (Gay Engineering Corp., Los Angeles), greatly simplifies the conventional cooling process.

And its efficiency has swiftly been evidenced in savings in labor and a reduction in elapsed time from fields to consumers.

This is a single-handling operation, as compared to the former method of transferring cased lettuce from the fields, placing it on pallets, then moving it both in and out of vacuum chambers before loading it on the cars.

The single-handling comprises spotting of the rail cars directly on field sidings. Field-packed in 40-lb. fiber cases, the lettuce is loaded straightway into the cars.

Flaps of the cases purposely are die-cut in such fashion that, when stapled closed, there's an open slit, or aperture, remaining via which the vacuum may draw moisture and also cool the product.

Cars are switched from the fields to tracks leading to the entrance of the new vac chambers and, as one car is moved in, a finished, vacuum-treated car is pushed out the exit end. With the doors at both ends of the chamber automatically, hermetically sealed, the chamber is put under 29.5 in. of vacuum.

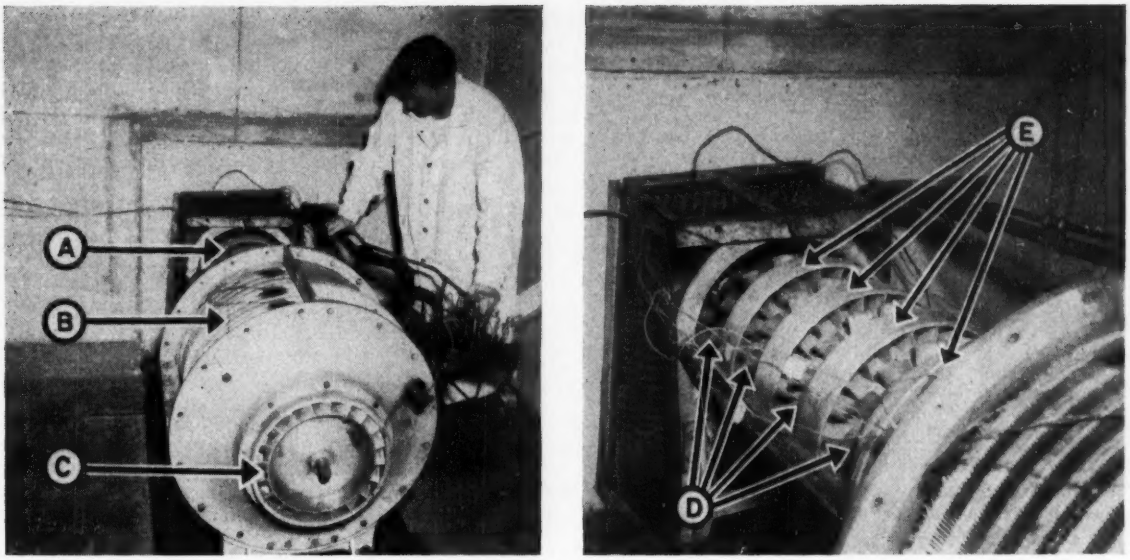
Closeup of Operation

Five Fuller 100-hp. pumps are used to reduce the pressure within the system to produce evaporative cooling by vaporizing the natural, excessive surface moisture from the lettuce. In addition to cooling, this treatment inhibits slime and bacterial growth in the lettuce.

Moisture removed from the product collects on refrigerated coils acting as a condenser. After each cycle of cooling is completed, the coils are water-defrosted to provide efficient moisture pick-up for subsequent cycles.

The control panel employed includes automatic recording instruments that record time and temperature for each operating cycle. The process is automatically stopped when the produce has been cooled to the desired temperature.

Time required for a cycle varies according to field temperature of produce and temperature desired. Free surface moisture content, barometric pressure, leak rate into the system, relative humidity, and dew-point all are further factors.



NEW refrigeration unit resembles a jet engine. Left photo: Turbo Chill unit comprises 4-stage, axial-flow fans (A); cooler (B); and single, axial-flow turbine (C). Right photo close-up shows the four rotary fans (D) and the four stationary diffuser vanes (E). Cooler is to right.

The Jet Comes to Refrigeration

Revolutionary new method chills beef and other carcass meats faster and with less shrink losses than current methods . . . Other food uses foreseen

FE STAFF

Recently designed is a new refrigeration unit that looks something like a jet engine. But cooling coils have been substituted where the combustion chamber might be. And the air flow, running to a velocity of 6,000 ft. per min., is used for heat-transfer purposes.

This, in a nutshell, describes the new Turbo Chill super-saturated refrigerating system*, which was principally designed to reduce product-shrink losses during chilling.

First successful application was by a large Midwest meat packer for rapid chilling of 'rail-suspended beef carcasses.

Unit can also be used for cooling other foods, particularly those where evaporation shrinkage is likely to degrade products.

Extensive tests have shown an average 24-hr. shrink loss of 1.9% when beef carcasses were cooled by conventional refrigerating techniques. However, with the new system, losses have amounted to only 1.3% over the same period—a difference of 0.6%. For extended periods of holding—up to 6 days—Turbo-Chill carcass-shrink losses increased slower than those cooled by conventional methods. Actually, shrink-loss differences were 1.1% for the 6-day period, as compared to 0.6% for the 24-hr. period.

What's more, chilling 500-600 lb. of beef carcasses from body heat (102 F.) to cooler-room temperature (34 F.) took 24 hr. by conventional method, but only 18 hr. in the new unit.

Reportedly, this more rapid method of chilling carcasses also curtails sour rounds and hams. Moreover, reduction of moisture losses from the surface of the carcasses has a marked tendency to maintain the "bloom" or fresh appearance of the meat. And meats have been held in a Turbo Chill cooler as long as three weeks without evidence of slime formation or discoloration.

Additional cooling tests are stated to have demonstrated speedier refrigeration by the new system. Loaded into two coolers, one refrigerated by the conventional method and the other by the new means, were 160 heavy steers (average weight of 371 lb.). Opening temperature of both coolers was 32 F. After loading was completed (in 1 hr.), temperatures were 38 F. in the Turbo Chill and 43 F. in the conventional cooler. Turbo Chill cooler never got above 38 F., but the conventional one went up to 47 F. in the next hour.

The Turbo Chill cooler was applying refrigeration to the load at the rate of 6.1 Btu. per hr. per lb. of meat. On the other hand, the conventional cooler was applying it at a 2.3-Btu. rate. And after 2 hr., it reached its 3.4-Btu. peak.

How "Turbo" Works

Specifically, this unit comprises 4-stage, axial-flow fans with diffuser vanes; extended, fin-coil cooler; and a single-stage, axial-flow turbine. Both fans and turbine are hooked up to a horizontal shaft, rotating at speeds depending upon the size of the unit.

Sizes of units, of course, can be varied to suit user's requirement. But

(*Turn to page* 199)

* Engineered by Chicago Stockyards Turbo Refrigerating Co. under direction of Wm. Wood Prince, president, and with cooperation of H. F. Hagen and W. F. Hagen.

FIRST comes collection of complete data on all equipment —location, maker, number—for your record system.

ALL TASKS should be covered by written work order. This establishes responsibility, minimizes errors.

Step-by-Step Guide to

Productive Maintenance

Practical 5-point program begins with inventory, then covers selection of criticals, routine controls, evaluation of equipment on basis of output, and scheduling . . . Illustrated here by care of electrical units, system protects capital investment, cuts product costs, raises manufacturing efficiencies

Part I of a Two-Part Article

THROUGHOUT the entire food industry, emphasis on mechanization is on the rise.

More and more operations are being controlled automatically. Non-stop processing—where a number of individual machines are coordinated to function in tandem as a single unit—is growing.

Little by little, the plant is being automated. The "*think*" needed to keep output flowing is being shifted from the *production* worker to the *maintenance* man.

Upkeep of the machines in your plant no longer is a simple job. Your equipment is becoming more complex. It requires more maintenance know-how and specialized skills. It is subject to heavier duty cycles. More and more, the responsibility for increasing production is dependent upon augmented effectiveness in maintenance —*productive* maintenance.

The idea behind productive maintenance—we'll call it PM—isn't new. Basically, it's simply a means of controlling factory equipment outages through the planned application of men, materials, and tools to help protect capital investment, increase production, and lower product cost.

What is new is the recent organization of this idea, by General Electric Co., into a simple sequence of five steps that can lead to better electrical system maintenance. Put to work, these steps bring—

More production from each machine. By substituting planned short-time outages for unscheduled breakdowns of uncertain duration and seriousness, actual down-time per year of each machine is reduced. You get added output without adding more machines — improving performance.

Higher output from a smoother work flow. In today's integrated operations, a breakdown in one machine usually affects others. Routine maintenance and planned outages reduce breakdowns to a minimum—assembly lines operate on schedule at their maximum rate.

Increased maintenance-budget effectiveness. A PM program will help you balance work loads more efficiently, reduce delays in dispatching—get savings in maintenance labor and materials. Extra-shift and overtime maintenance can be reduced. You increase budget effectiveness and obtain closer cost control. Here's how to proceed:

Step 1—Gather Complete Equipment Data

An equipment inventory will form the basis of your record system. Then the initial move in controlling maintenance costs is to conduct a survey of all the electrical equipment in your plant. You have to know just what you have and where it is.

For proper identification of each unit, an inventory number must be assigned. Usually used is a system

that indicates building, floor, and machine number. The number is put on the equipment or machine, in a prominent place.

You can simplify your inventory by using record sheets or cards listing general data desired, and the special information you need. Area mechanics or trainee engineers can then fill in these sheets. In some plants, a maintenance clerk makes the inventory. In this way, he can become familiar with all equipment. Then, when the program is in operation, he will be more able to handle the various clerical reports relating to the equipment items.

The plant engineer should also review the sheets—he can add any other data necessary before the permanent record is made.

A complete, well-edited record sheet or card should include a description of the equipment, application, rating, serial number, manufacturer, vendor or agent, purchase order number, cost, rating, and machine or equipment number. Space should also be provided so a record can be made of the original location of the unit and all subsequent changes.

These cards can serve as plant property records or, if separate property records are kept, can supply the basic property record data. This includes the identification of the equipment as well as the original and installation costs.

Function of the record sheets can be improved by compiling an index of equipment by class or type. This also provides an easy way to find the total number of units of any particular item.

Step 2—Determine Extent of Routine Maintenance

Here you decide how much care is warranted by the importance of the equipment. Objective is to determine the best or most desirable amount (not the greatest amount) of maintenance required for your electrical system. Include only those items where PM will pay, or help make workers safe. Anybody can essay a complete maintenance job—but that is unnecessarily expensive.

In some cases, it is cheaper, and will do no harm, to replace or repair a part after it wears out, rather than to apply the program to it. As an example of this thinking, if several operations are dependent on a single punch press, the need for PM is evident.

However, if the load of this punch press can be picked up elsewhere, the need definitely is not as essential. Equipment that is not considered important enough to be brought into the plan can be repaired in answer to nonscheduled requisitions by production supervisors.

Step 3—Establish a Routine Operating Control System

Set up inspection schedules, work orders and cost records, and a renewal-parts stocking system.

In Steps 1 and 2, you have done all of the preliminary work you need in order to establish a routine operating control system. You have prepared a list of all plant assets and recorded them, you have set up a numbering system to identify each piece of equipment, you have determined the duty and application of the equipment.

Next task is to arrange an inspection cycle that strikes a balance between "too often" (with resultant waste of money) and "not often enough" (with the possible damaging outages that can occur).

The repair record will tell if more attention is needed. Ask your inspectors to note on their checklists or report forms whether the frequency can be cut down.

Many companies have specialized inspectors who do not do any actual repair work, but who inspect equipment for repair needs without interfering with production. These inspectors should work on a schedule, checking according to a set of instructions or check sheets. They should also keep written records and make reports. Usually, they inspect one type of equipment at a time. Their inspection trips are ordinarily dispatched by the maintenance department, and the reports they make initiate repair orders.

To Get Greater Control

Inspection reports must be made to the maintenance foreman of each section in writing. This daily report must then be analyzed to determine material and labor requirements and estimated time necessary for completion of each job. With this analysis, the foreman can then set up proper maintenance schedules for his electrical crew. He can place orders for the material required. If additional man power is necessary, or if repair periods must be discussed with operating personnel, it can then be arranged.

You have used the equipment records set up in Step 1 to organize your inspection system. Now you are ready for the next move—setting up a work-order program for routine maintenance.

There is no such thing as a universal work-order program. Each plant has to develop its own system—but each plant can benefit from patterns and systems used elsewhere. In other words, the details must be individually tailored to the individual plant, but basic purposes are common.

Streamlining your work-order system can have a striking effect on maintenance costs. For instance, one company recently reported that it redesigned its work-order form and work-order system with a resultant reduction of 23% in emergency repair cost and a 14% reduction in routine maintenance cost. These savings were made despite the fact that, previous to change, the system appeared to be in good order.

A work order is actually a bid for action. But there is a great deal of information that must be included. This basic data is organized as follows:

Job number, location, department number for charging purposes, craftsmen required, urgency of job (date required), description of work, cost estimate (labor, material), cost actual (labor, material), and approval spaces.

Work orders should include only essential information, and should be clear and concise. They should be complete enough so that additional inspection is not necessary prior to actual work. By indicating the date when the work must be done, there can be proper scheduling of men and material.

Number of copies of the work order will vary from plant to plant. A typical job order form might have an original copy for the worker in charge of the job, a duplicate for the maintenance superintendent, and a triplicate for the control clerk to be used as a costing copy. Some plants also prepare a fourth copy for the storeroom, as part of a material-costing procedure.

The work order is often used for indicating to the man performing the job just what safety precautions should be taken, such as de-energizing equipment before performing any work. The maintenance worker is always faced with the production department's reluctance to stop the equipment—but if this information is included on the work orders, the argument is transferred from the worker to the supervisory level.

No Order, No Work

First rule in any work-order system is this: All work done by maintenance must be covered by a written order.

Experience has shown that when

written orders are neglected, work is often called for that is unnecessary, improper, or that has already been requested. Or, sometimes, orders are issued for work that should be done at some other time because the proposed work relates to a larger job being planned.

A written request lets you screen out unimportant or unnecessary work. After verbal requests have been turned down a few times, people will stop making them. A written request will establish responsibility, help prevent mistakes or misunderstanding about what is to be done, and provide the data necessary to accumulate costs.

Of course, it may be necessary in cases of emergency, to make the order out after the work is started. But in all cases, make one out. In the case of standing work orders applying to routine maintenance, be sure that these orders are actually limited to this type of work and do not become catch-alls for jobs that should have their own separate orders.

A smooth-functioning work-order system offers several advantages: First, you get fewer upsets in scheduling. The number of "urgent" orders is reduced. Second, make-ready is lowered. You lose less productive time in getting at the work each day. Third, work is finished faster. There is a minimum loss of time between writing a job order and working it out on the machine.

Approvals Are "Musts"

The subject of prior and subsequent job approvals for work orders has long been debated. With regard to prior approvals, care should be taken that all jobs needing approval be considered promptly. This approval should not become a formality. At the same time, it should not become a factor that delays jobs so much that emergency action becomes necessary.

Prior approval has several advantages: It allows you to obtain engineering consideration of what may be impractical production ideas, and it lets you control situations where the equipment does not warrant maintenance investment because of age, application, or efficiency. Usually, prior approval is mandatory when the job-cost estimate is over a certain dollar value.

The advantage of subsequent job approval is fairly obvious. Not only does it officially close the job, but it prevents a number of arguments regarding the quality and cost of the work.

Some companies make an effort to set up standard repair instructions and file vendors' repair instructions to help the maintenance man performing the work. If you plan such a system, your maintenance clerk should give this information out with the work order.

On Keeping Costs

Estimates and actual costs of maintenance provide a way to control the cost of services rendered. Only with an estimate can the need for a job be evaluated, and only with actual costs can the performance of equipment be appraised.

All repair jobs should be estimated with emphasis on a greater percentage accuracy on the larger jobs. This system enables the craftsman to have a rough yardstick of his expected performance. On larger, engineered jobs, the maintenance supervisor can obtain job progress reports that enable him to keep control of the task by comparing the cost for a certain degree of job completion with his estimate.

What about material costs on each job? Here again, the degree of control must suit the individual plant requirements. In general, however, all major material for a specific job should be charged against that job order. On the other hand, it is usually not worthwhile to cost stock items such as nuts and bolts—rather, for them, a percentage factor can be used to load all work orders with the cost of this standard authorized material.

If cost estimates and actual costs are inaccurately applied, costing information will soon lose its meaning to the maintenance man and the equipment records will not truly reflect the equipment performance. Definite costs standards must be set up, or the system is a waste of effort.

The historical card is a record of upkeep costs—material and labor—of the equipment. Many companies use this type of card to maintain the cost record. Others prefer to file an actual copy of the costed work order. These work orders are usually thrown away after periodic review.

Your next job is to get a list of parts. Ask your electrical equipment manufacturer to supply you with clear and complete recommendations of renewal parts to stock. Log the manufacturer's part numbers for each piece of equipment on its record card.

In many cases, your own experience with a certain type of equipment is invaluable. For example, the equipment may be located in an area where there is a corrosive atmosphere. In that case, your own experience would indicate the vendor's recommendations were probably too low.

In other cases, you may know that a local parts distributor carries the parts required for the routine maintenance of certain equipment, in which case your stock can be maintained at a lower point.

(*Turn to page 190*)

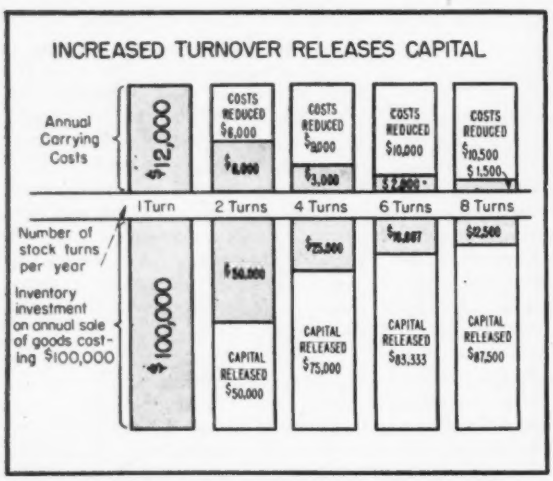
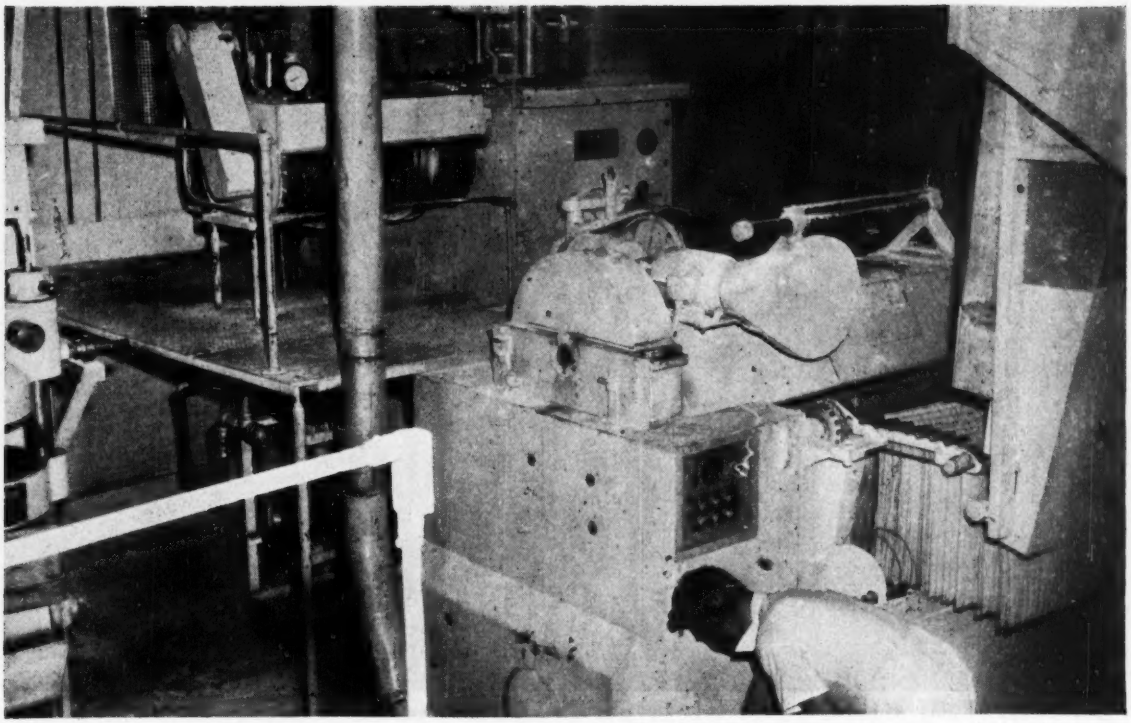


FIG. 1. USE this chart as a guide in determining optimum turnover point for parts carried in inventory.

SET UP PLAN that will make renewal parts available immediately for routine maintenance and repairs.



CONTINUOUS spaghetti machine's mixer bowl (top background) is kept under vacuum by pump, set directly below. Product extruded from unit is automatically picked up on sticks (lower right) and goes to dryer.

MIXING IN VACUUM

Ups Product Quality

Process chambers of a continuous mixer-extruder unit are now maintained under vacuum—with resultant product a smooth, firm, rich spaghetti

F. W. McCARTHY
Associate Editor, "Food Engineering"

Application of vacuum to a continuous mixing-extruding macaroni processing operation has upped product quality in many ways.

It produces a smoother, firmer, better appearing and cooking macaroni and spaghetti. Unit involved is the DeMaco continuous press,* to which vacuum equipment has been added and made an integral part.

Improved product characteristics are confirmed by the following analysis conducted by an independent agency —Jacobs-Winston Laboratories Inc., New York City. Sample spaghettis tested were made on the same day, from the same ingredients, on the same press, then were dried in the same room. Production methods differed only in that one spaghetti was made under vacuum, the other under atmospheric conditions. Here are the results:

The non-vacuum sample showed a moisture content of 11.2 and ash of 0.55, whereas the vacuum product had a moisture content of 11.4 and ash of 0.56.

Question of mechanical strength of macaroni products has always been regarded as one of the criteria of its quality. It was therefore deemed advisable to compare the breaking strengths of these two products.

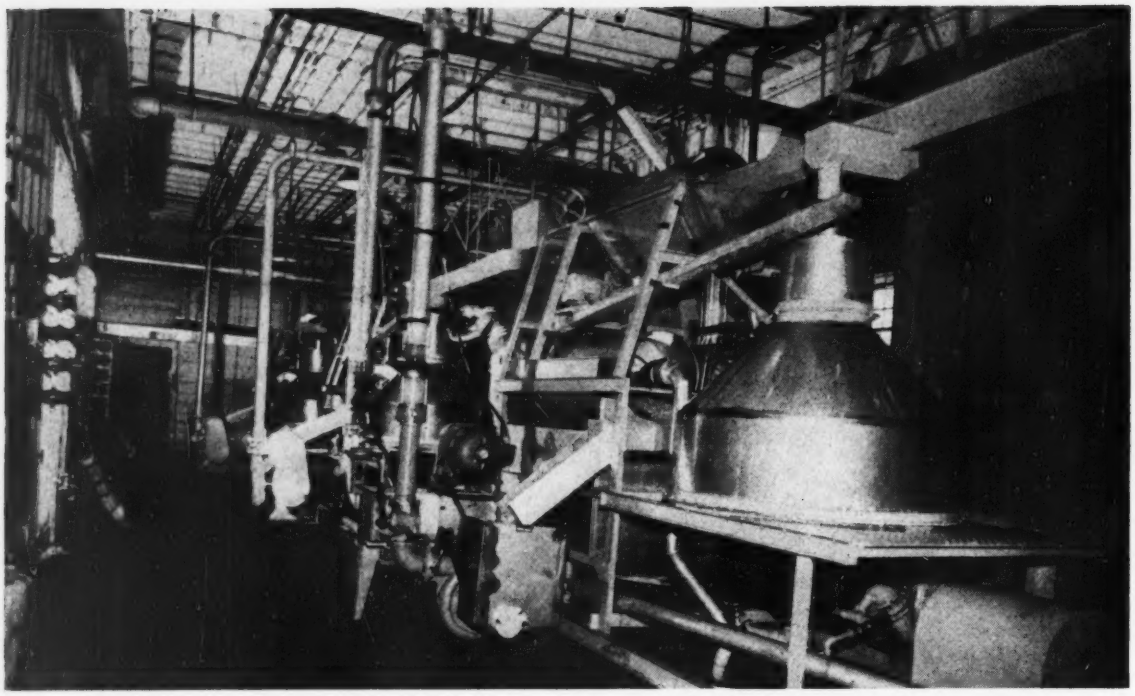
In laboratory tests, strength of a product is judged by its resistance to breaking. Here average breaking strength of 10 strands of spaghetti is taken as the value of the product. Individual breaking tests seldom vary more than 10% in the same sample.

Test results on samples of these two types of spaghetti were as follows: The atmospheric product had an average breaking strength of 48.3g. for 10 samples. The vacuum product, for 10 samples, averaged 57.6g. These tests show the latter to have a 20% greater resistance to breakage.

Both products also were evaluated for color. This characteristic is another important criterion in quality of macaroni products. The visual examination of these two samples showed a distinct difference in the amount of yellow. Vacuumed spaghetti was a deeper yellow than the atmos-

(*Turn to page 166*)

*Equipment is manufactured by DeFrancisci Machine Corp., Brooklyn, N. Y.



PEAS are dry cleaned, flumed to washers, then elevated to froth flotation cleaners (one shown in foreground). Following cleaning, they flow to hydro-pumps (center) that elevate them to second-floor processing area.

Streamlined Conversion
From Canning to Freezing

By engineering multi-product operation to enable maximum use of equipment without interfering with flow of different products, plant output is upped and labor requirement cut

Part I of Two-Part Article

W. E. HELIN and C. R. HAVIGHORST

Respectively, Chief Engineer, Pictsweet Foods, Inc., and Senior Associate Editor, "Food Engineering"

In 1952, Pictsweet Foods' Mount Vernon plant was a 4-story, 5-line pea and corn canning plant.

Then in 1953 this facility was transformed to a two-story freezing plant with an hourly capacity of 8 tons.

This modern, streamlined plant freezes peas, cut corn, cob corn, cut broccoli, broccoli spears, and diced carrots. The plant continues operation during winter and spring seasons on repack of succotash, peas and carrots, and mixed vegetables.

Management set these specifications for the production department in its revision of the plant to new form:

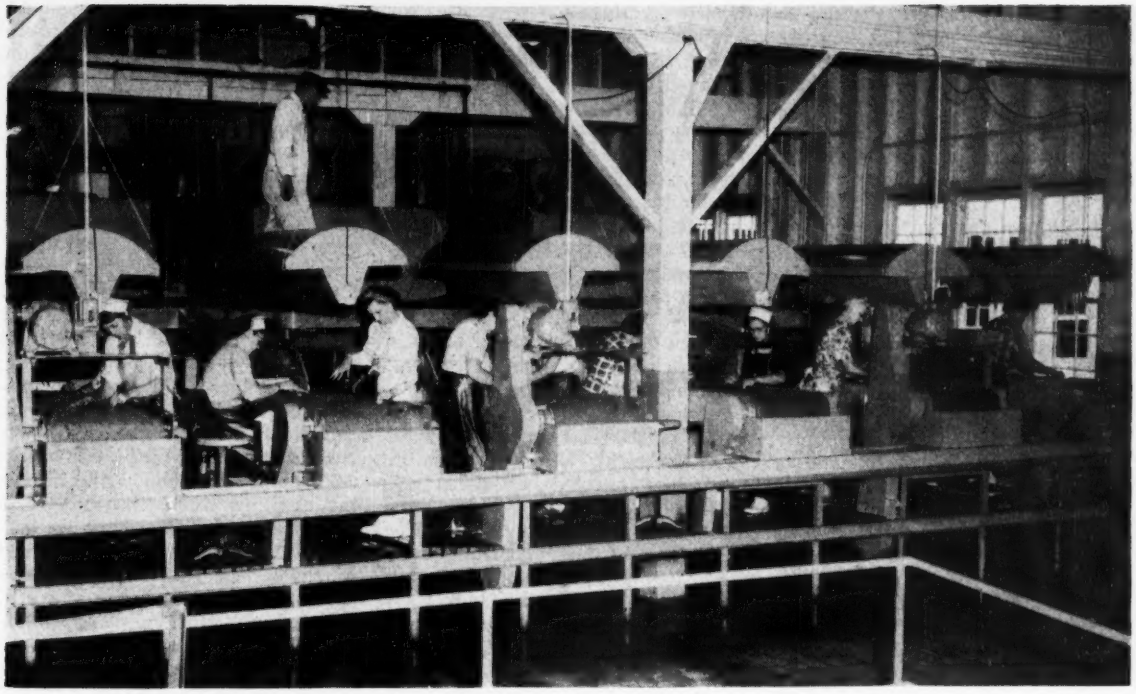
1. Design and erect (a) multi-purpose processing and packaging lines for six products, and (b) multi-purpose mixing and packaging lines for 3 products, with assurance (c) of maintaining in these lines maximum quality standards, while using (d) a minimum of labor.

2. Design these processing lines for continuous 24-hr. operation to obtain maximum daily plant capacity.

3. Design and erect a freezing system to freeze peas, cut and cob corn, broccoli spears and cut broccoli, and diced carrots at the production rate of 8 tons an hour.

Fortunately, three of these products are compatible in a number of identical or similar process unit operations. Also, the three major products are harvested at different times. And, except for slight overlapping in time periods, none interferes with processing of the others.

It remained, then, for the engineering department to devise efficient process lines in which certain machines and equipment could be so arranged as to be available for these different products. Final design utilized only three complete lines for processing peas, cut corn, and broc-



INSPECTION belts have amber-colored surfaces and are illuminated by special fixtures that produce a reflected, indirect light approximating daylight. Flume (foreground) moves products to freezing tunnels.

coli. Conveyors or flumes connect the pea and corn lines with additional unit operations required to process cob corn and carrots.

All loose frozen products are filled into cartons and wrapped by the same packaging lines. Hand packed products also use a single but different packaging line.

Peas Around the Clock

Pictsweet's frozen pea pack centers around this Mount Vernon plant. To maintain a uniform steady flow to the plant, there are three sets of viners, consisting of 28 units, operating during the day (4 AM - 4 PM) and three sets, consisting of 24 viners, operating during the night (4 PM - 4 AM).

Truck-loads of filled lug boxes are palletized at the viners and delivered to the plant within an hour. Palletizing helps keep truck-loads secure, reduces receiving labor at the plant, and eliminates excessive truck stand-by time.

Upon arrival at the plant each load is sampled individually and ticketed to indicate variety, tenderometer reading, percent dock, total number of field boxes in lot, and time of arrival.

The process begins when peas are dumped into receiving hoppers. Information on variety and tenderometer tests is conveyed to the quality grader operator and packaging room over an inter-com by the receiving foreman. If variety or tenderometer reading are sufficiently different from preceding lots, a one-minute break is made in the continuous flow of the process.

In the plant, peas are first cleaned in a mill, then flumed to a washer. If initial examination indicates special cleaning is required, they are flumed to an elevator and thence to froth flotation cleaners. If special cleaning is not required, these units are bypassed and peas are flumed directly to a hydro-pump and elevated to the second floor. At the discharge of the hydro-elevator, peas are dewatered in a reel. Water separated from peas flows through a scavenging reel and back to the pump. Approximately 85% is returned. In-plant chlorinated water is added at the rate of 15% to the recirculating water system in the flume which conveys peas to the pump.

FOR 4-PAGE FOLDOUT FLOW-SHEET of Pictsweet's advanced multi-product freezing line, see pages 134-137.

Dewatered peas are blanched in a rotary hot water blancher, then washed with clean, chlorinated water in a rod-reel washer and flumed (in cool water) to attain a uniform product temperature before entering the quality graders. Peas are elevated in a perforated bucket elevator, then are further drained on a wire-mesh belt to minimize dilution of the grader brine.

So-called "floaters," the fancy grades, move through this process on a straight line basis. "Sinkers," standard grades, are frozen later. To insure a good separation, three quality graders are usually employed, although two could carry the load.

Special Belts, Lighting

Peas are dewatered and conveyed to the amber-colored Fabreeka inspection belts. These are illuminated by special lighting fixtures, designed and built by Pictsweet, which approximate daylight conditions.

Consultations with lighting engineers showed that color is an important factor in lighting for visual inspection. Intensity of 100 cp. is a pre-requisite to good inspection. However, intensity was no more important a factor than color. This light fixture produces a reflected, indirect light of ample intensity. Different types of bulbs are used for red products and green products to attain maximum efficiency.

The hood reflector and trough containing the light bulbs and tubes are designated to prevent any possibility of a hot bulb being struck and broken by wash water and thus introducing glass slivers into the line.

After inspection, peas are flumed to the freezing tunnels. The load is equalized by having three inspection belts feed each of the two flumes. The flumes empty into a dewatering vi-

brator and the peas are elevated to a spreading device located at the entry of each pre-cool belt. In elevating, the product is passed under a hood where sharp blasts of air drive off more moisture.

The spreader, when under full load, distributes peas uniformly to a thickness of 0.9 in. over the 8-ft.-wide wire-mesh belt of the first pre-cooler. Here, they are cooled and dried by air at 30 deg. F. during a course of 3¼ min. Then the product drops onto the belt of the 2nd pre-cooler, where it is piled 1¼ in. deep. Peas are further cooled and dried on this belt by 20 deg. F. air for 5¼ min.

When they reach the end, their temperature, at centers, is approximately 35 F., and their surfaces are slightly frosted. Final freezing is in the main tunnel, where for 16¾ min. the product is blasted with −20 deg. F. air. Load is 1½ in. deep on this belt.

An arrangement of 9-in. galvanized screw conveyors carries the product to: retail fillers, institutional fillers, or bulk filler. Conveyors are fabricated with a minimum of ⅛ in. clearance between trough and screw at bottom to prevent product damage. Also, since maximum sanitation is required, self-lubricating lignum vitae bearings are used to eliminate possible product contamination by grease or oil from hanger bearings. Conveyors are equipped with hinged covers and reversing switches affording access for thorough cleaning.

Three Type Packs

All products entering fillers from overhead screw conveyors pass grid magnets that remove any tramp metal. And to assure accuracy of fill weights, the product goes through a cluster-breaker to reduce it to individual particles.

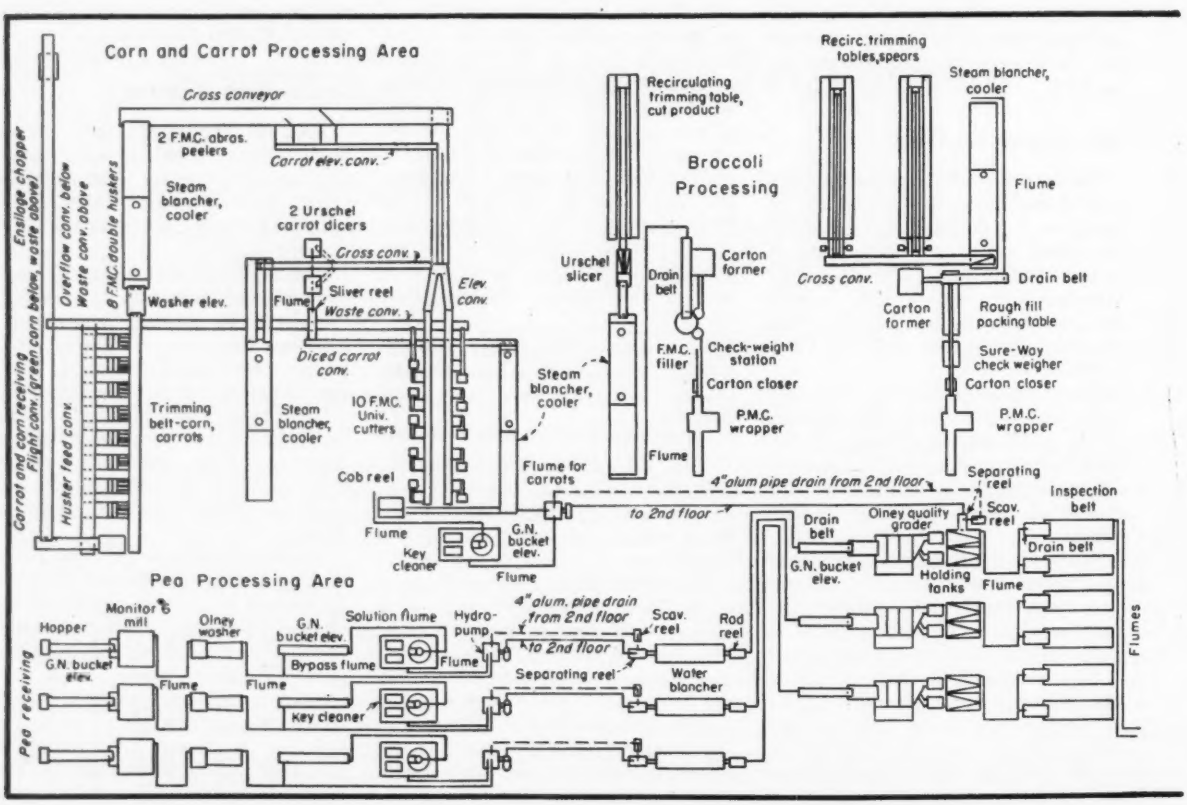
As an added assurance of accurate fill-in weights, a continuous sampling is maintained and charted. Statistical operating range (filler capability) is recorded on the chart and, if variation is noted indicating loss of control, the situation is corrected immediately.

There are two retail filling lines. Each filler automatically forms, fills, and closes cartons, operating at a speed up to 300 per min. However, since part of the pack is bulk packaged, the lines are run at 160 per min., optimum speed of the wrapping machine. The retail line is thus capable of handling 6,000 lb. maximum capacity (5,400 actual, due to 10% down-time to change paper at the wrapper and adjust filler). The remainder of product is diverted to bulk pack.

Retail packages are coded by a special device, developed and manufactured by Pictsweet. It places the marking directly under the black band on the label vignette. After wrapping, cartons are manually packed, 24 to each previously coded case, supplied from the second floor by means of a chute. Filled cases are conveyed by roller conveyor to an automatic sealer and an automatic unit that prints required information on the end panel. Cases are then palletized and moved to the −10 deg. F. cold storage. Forty-five minutes after peas enter the process they are frozen, packaged, and stored.

Bulk product is conveyed into stainless steel hopper above filling station and packaged in MVP triple-thickness kraft paper sacks. Filled (60 lb.) sacks are conveyed to a Union Special sewing machine, where the throats are securely sewed. Then they are palletized and stored in the refrigerated warehouse. Bagging saves warehouse space and eliminates re-use of costly, telescoping "suitcases" and inner-liners. This company pioneered the development of sacks, which are now acceptable for shipping by the railroads.

Institutional (2½ and 5 lb.) cartons are conveyed by screw conveyor to a filler made by the company. The 2½-lb. pack takes the normal overflow from the two retail lines and op-



erates at 35 per min. It is necessary to shut down one retail line and feed the production of one tunnel and the overflow from the operating retail line to supply the institutional 5-lb. line. In design of the system, this flexibility was the determining factor in locating gates and selecting speeds for the packaging room screw conveyors.

Corn Harvested Mechanically

Five FMC mechanical pickers harvest the corn, operating both day and night. As with night vining operations, a steady flow of field-fresh produce is delivered to the plant. Mechanical pickers not only cut harvesting costs, but they eliminate the farmers' problem of procuring help. In addition it is felt that by mechanically harvesting corn—which eliminates most trash in the form of leaves, stalks, and immature ears—speed and rate of production is increased.

Corn is delivered to the plant in dump trucks and emptied on a 122-ft.-long concrete apron directly in front of a recessed flight conveyor. It is fed into this conveyor by a tractor equipped with a specially designed wide blade that does not damage the tender kernels still protected by nature's husk.

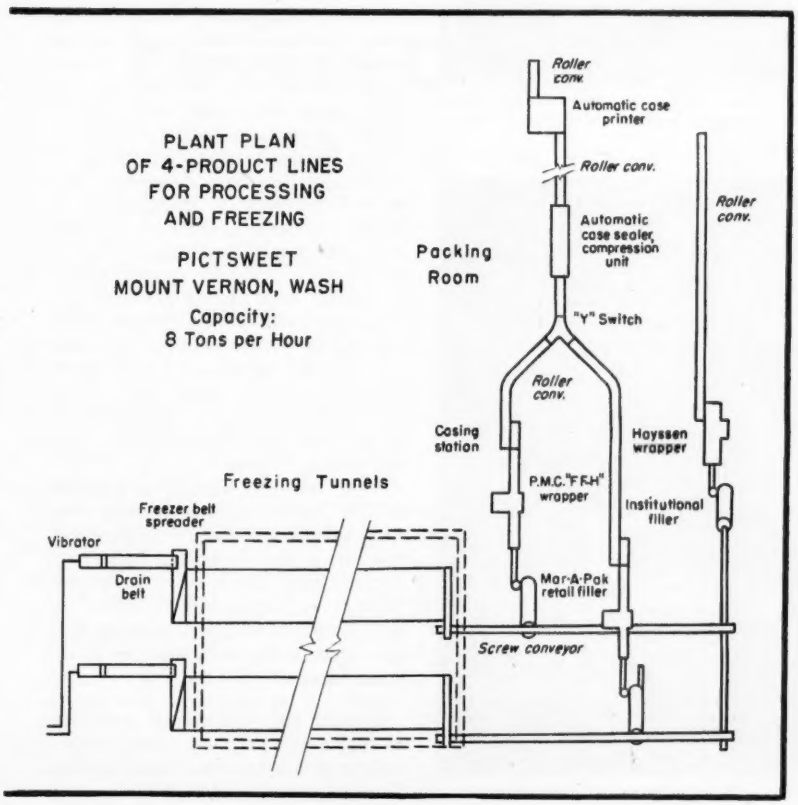
Flight conveyor operates continuously moving green corn to the huskers, and, on its return run (at a higher elevation), bringing waste from husking and cutting operations to the ensilage cutters.

To insure an ample supply for the eight double-huskers, corn is conveyed into the plant in excess of husking capacity. This excess tails over at the end of the conveyor feeding the husker bins and is conveyed back to the flight conveyor at the receiving apron. Amount of overflow is always visible to tractor driver enabling him to gage husker requirements. By starting at one end of the apron and working down, the corn is always processed on a basis of "first-in, first-run."

At discharge end of the huskers, corn drops on a 24-in. inspection belt, where trimming can be done if necessary or partially unhusked ears returned to the rubber stripping rolls of the huskers.

Corn is elevated in a company-designed draper rod, high pressure washer to a 6-ft.-wide steam blancher. All ears are pre-blanched and cooled by a "fog-spray" section of the blancher. The fog-spray is a Pictsweet innovation employing the principle of cooling by evaporation. Water is atomized before it contacts the warm product. And the moment droplets contact the product, the latent heat of evaporation is extracted.

Pre-blanching sets color of kernels and allows uniform selection of corn ears that are suitable for frozen corn-on-the-cob. It also serves the purpose of increasing recovery of cut corn by partially setting starches in kernel.



Cob-Corn Frozen In Tunnel

Ears selected for corn-on-the-cob are cut to length (5⅛ in., to fit into a 5¼ in. package) in a cob cutter, company designed and constructed. It is then steam blanched, again fog sprayed, then loaded into aluminum trays for freezing. Six dozen ears are placed in each tray and 26 trays are loaded on a cart which is moved into the freezer. In less than 4 hr., ears are frozen, they are manually packaged, two to a carton. Cartons are automatically formed, closed, and wrapped.

Labor is kept at a minimum. Due to the size of the ears, some manual selection and positioning is necessary, otherwise the line would have been made completely automatic requiring only a dumper, carton-forming machine operator, and caser.

Ears not selected for cob corn are conveyed to ten corn cutters. Cobs are moved to the central conveyor and with waste from huskers are conveyed to the ensilage cutter. Cut corn drops through discharge spout of cutter onto a belt conveyor and is moved to another steam blancher. (Flumes are not used here since leaching of product would result.) Return of this belt is under a constant spray of chlorinated water.

After blanching and fog spray cooling, corn is elevated to cob reels (to remove any large pieces of cob or husk) and then go to a flotation cleaner which removes any objectionable silk, loose skins, and small pieces of cob or husk. In this process, no oils or detergents are used—only fresh water. Starches from the corn will support a froth when air is added to the water.

The clean, cut corn joins the pea line when it is pumped to the dewatering reels. It then follows the same line and is frozen in the same manner as peas. After freezing, the retail pack moves through fhe same packaging lines as peas. Corn destined for future repack, as mixed vegetables or succotash, is bulked into 60-lb. MVP paper sacks.

Carrot Operation

The third product, carrots, completes the plan for overall operational economy. This pack serves to: (1) Increase length of operating season, and (2) furnish an important component for the winter repack of mixed vegetables and peas and carrots.

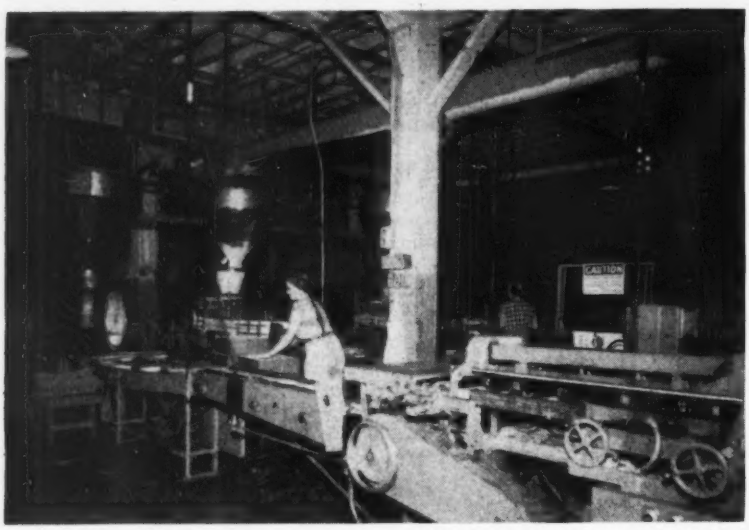
Carrots are dug mechanically and delivered to the plant in dump trucks, thereby reducing raw product handling costs. The corn flight-conveyor is also used to supply carrots to the processing line.

After washing under high-pressure sprays, carrots travel the same equipment used for corn. They are rough trimmed on the corn trimming belt, washed again in the draper washer, and elevated to the steam blancher. Following steam blanching to soften the skins, they are then abrasive peeled.

Peeling can be accomplished without the blanch. However, it was found the waste was cut down and peeler capacity was increased by a short blanch.

Product next is diced and flumed to a sliver eliminating reel in which chips resulting from dicing are removed. Then the carrots again join the cut corn line and are blanched and fog-spray cooled, flumed to the hydro-elevator, and pumped to inspection belts, and go to the belt freezing tunnel. All diced carrots are bulked for future consolidation in repack of peas and carrots and mixed vegetables.

To minimize handling, broccoli is palletized in the fields. In the plant it is graded, then segregated for either the cut or spear lines.



SCREW CONVEYOR (top) moves products from freezer to fillers (left). Filled packages are wrapped (foreground), then manually packed in cartons, which are sealed.

SEALED cartons are palletized and go to —10 F. storage by fork-truck.

Spear broccoli is dumped from crates onto a recirculating, trimming belt which provides a continuous flow to women working on either side. Its overflow is sheared to a central belt and returned to the beginning of the line, providing a constant supply for the trimming operators.

Heretofore, filled crates were set before the trimmers. This laborious operation was eliminated and work speeded by using the trimming belt. Trimmers need no longer turn to the crate, remove the broccoli from the tightly packed mass in the crate, and then turn back to trim it.

Trimmers do not cut broccoli to length. They merely split the large heads, trim off leaves, and then belt-feed product to trimming knives.

These cut it to uniform length. It is then blanched and fog-spray cooled, then flumed to a dewatering belt feeding the packaging line.

Reduces Packaging Labor

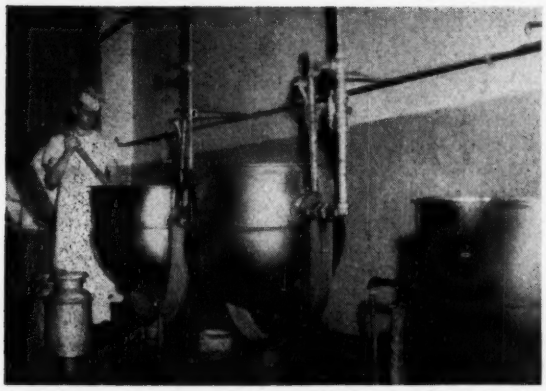
Packaging has also been designed to eliminate labor. The packing table has two product conveyors, one on each side of a central chain conveyor, which delivers cartons. Packers place broccoli in the moving line of empty cartons until they appear filled. Packages are then weighed by a Sure-Way checkweigher which rejects the light- and over-weight ones—proper fill of these being cared for on packing scales.

Filled packages are closed by machine, coded, wrapped, and placed 3-dozen to a tray for freezing (taking approximately 4 hr.). Then they are hand cased, and cases automatically sealed, printed, and palletized.

Cut broccoli is also trimmed on recirculating trimming conveyors. But in this instance it is trimmed to length by hand as well as trimmed longitudinally. The broccoli then is placed on a conveyor running above the return recirculating belt and conveyed to a Model O Urschel slicer and cut to 0.8-in. length. This slicer was modified by placing a floating top compression belt above the normal feed belt, thereby increasing its capacity by insuring a positive feed into the cutting knives.

Next, the cut broccoli is elevated to the steam blancher, then fog-spray cooled and flumed to combination drain and inspection belt. It is automatically rough filled, and each package is check-weighed before being closed and wrapped. Cartons then are cased in the same manner as the spear broccoli.

Design and operational procedure of Pictsweet's belt and tunnel freezers will be detailed in the concluding Part II of this article in Dec. FE.



1 **CREAM** sauce is made in kettles, then blended with crab meat and seasoning in mixer (far left).

2 **MIX** goes into hopper of automatic pattie-forming machine. Girl (right) check-weighs patties.

3 **PATTIES** are placed in pastry shells, then coated with batter and crumbs for frying.

4 **THEY'RE** finally pre-chilled and frozen. Girls pack them in cartons, which are machine-overwrapped.

Deviled Crabs: 25,000 Daily

This processor of specialty foods gains good foot-hold in today's highly competitive frozen food market with deviled crabs in edible pastry shells

FE STAFF

Suppose you wanted your wife to prepare deviled crabs. Know how long it would take her? About 2 hr.

A time-consuming chore, that! And if you asked for them a second time, chances are there'd be protests.

One processor of such specialty foods—Eat-All Frozen Food Co. of Philadelphia—has solved this problem neatly with its 6-oz. package of flash-frozen deviled crabs. All it requires is to un-package them, heat, and eat.

6-Step Brief

What's more, no waste is involved. For these crabs are made up in edible pastry shells formed into the shape of the natural crab shells. The company turns out 25,000 daily.

Making deviled crabs at this plant is a 6-stage operation. Here are details:

1. Cream sauce is prepared in stainless steel, steam-jacketed kettles, then blended with seasoning and other ingredients in a horizontal, batch-type mixer.

2. Deviled crab mix then is charged into the hopper of an automatic patty-forming machine. Here, a screw feeds mix to five cylinders bored into a revolving disk that serves as the forming unit and as a circular conveyor.

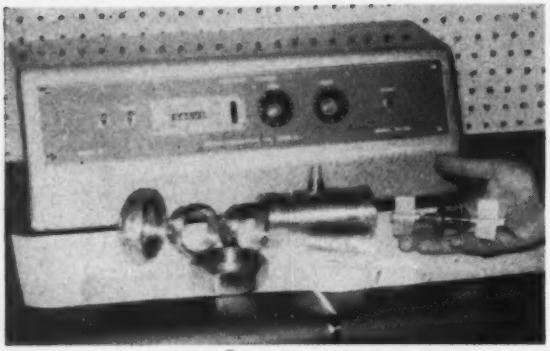
Below each forming cylinder are a cam-operated piston and piston rod. Deviled crab pattie is shaped in the cylinder under pressure of the screw feed and just as the piston rod passes over the cam. Pattie then is forced up to the top of the revolving disk. When piston is in discharge position, a circular knife, revolving in opposite direction but parallel with the disk, removes the pattie.

3. Crab-shaped patties then are placed on the edible pastry shells and loaded onto trays for transfer to the egg-batter station. Here, deviled crabs go into a small stainless vat holding several gallons of batter. From this small vat, a 3-ft., pulley-driven, inclined wire-mesh belt picks up the "crabs," draining excess batter from them as they are discharged into a wooden tray containing bread crumbs.

4. A trayload of breaded deviled crabs is then submerged for a few minutes in a batch-type, deep-fat fryer. Temperature of the frying fat (hydrogenated vegetable oil) is 375 deg. F. Next, each tray is elevated out of the fryer to permit draining of excess cooking fat.

5. Trays are now loaded onto racks that are rolled into a blower-type pre-chill room (25 deg. F.). Product then

(Turn to page 176)



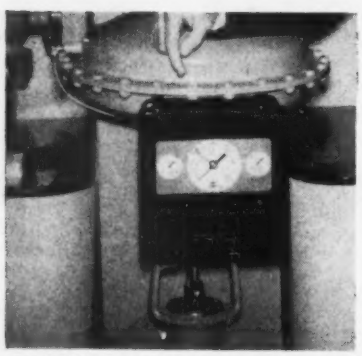
SANITARY FLOW METER of easy-to-clean construction. Turbine (in hand) is rotated by flow inside pipe and its magnet produces electrical pulses in metering circuit.—Potter Aeronautical Co., Union, N. J. (100A)

FLOW COLORIMETER measures color or turbidity for in-stream control of continuous processes. It operates photoelectrically, has stainless flow cell.—Beckman Instruments, Inc., Fullerton, Calif. (100B)

New Process Controls

Elusive variables monitored by units seen at Instrument Society of America's Philadelphia show

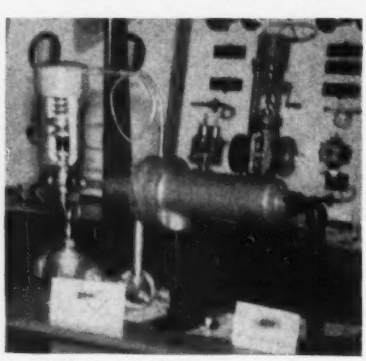
FLOW OF SOLIDS over motor-driven impeller creates metering torque proportional to mass rate of flow in Massometer.—Wallace & Tiernan Co., Inc., Belleville 9, N. J.—(100E)



PRESSURE PILOT has sapphire feed orifice with pushbutton cleaner, control-point setting, and interchangeable reset unit.—Hammel-Dahl Co., Providence 5, R. I. (100C)

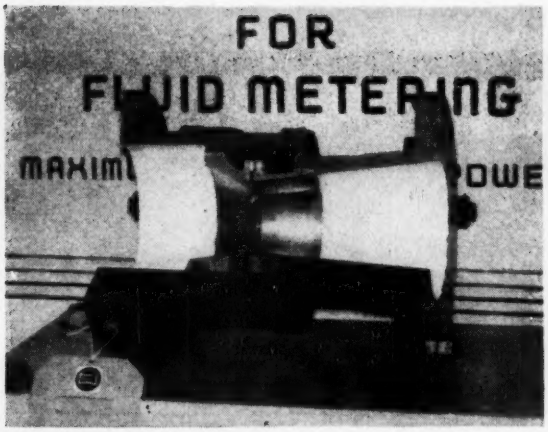
ELECTRONIC SCALE using strain gage, in platform and continuous-belt types. Has printer, automatic range shifting, direct-reading of tare weight. —Fairbanks-Morse, Chicago 5. (100D)

TYPEWRITER or card-punching machine can be operated to put instrument data into useful new forms by electronic potentiometer.—Bristol Co., Waterbury 20, Conn. (100F)

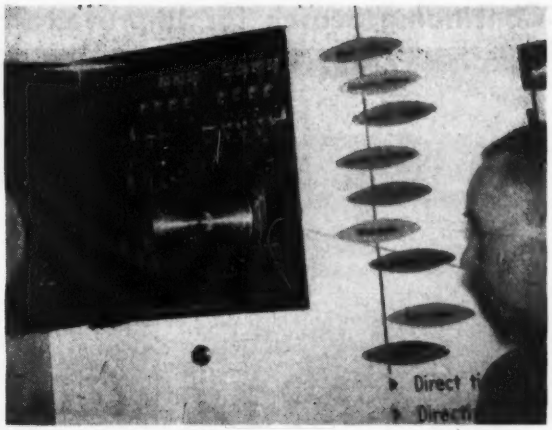


HOT-COLD WATER mixer has large annular temperature bulb to actuate valve. Another model mixes steam with water. Robertshaw-Fulton Controls Co., Knoxville 1, Tenn. (100G)

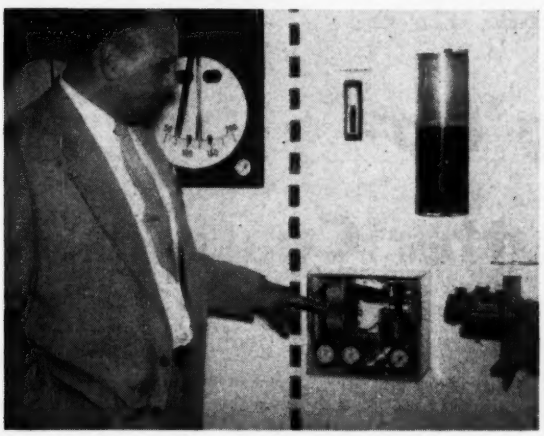
WATERPROOF case for pH indicator actually had water spraying over it at exhibit. Medium-size indicators with large dials also were shown by Leeds & Northrup, Philadelphia 44. (100H)



NEW FLOW tube minimizes pressure loss in differential flow-metering of fluids. The Dall tube is short, easy to install, has stable discharge coefficient.—Builders-Providence, Providence 1, R. I. (101A)



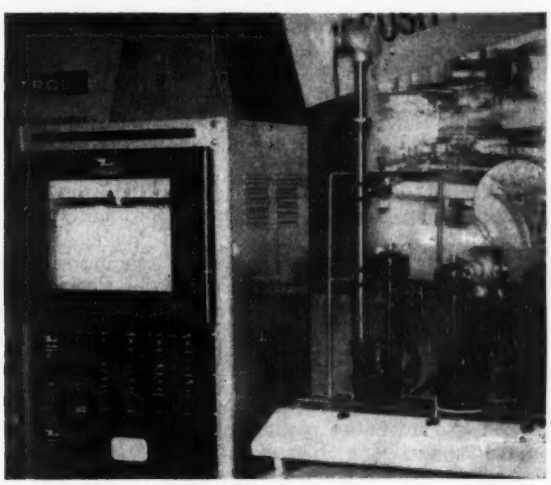
ADJUSTABLE CYCLE timer for process control has eight movable "pins" on periphery of large rotating time dial. Pins trip switches to actuate process steps.—Taylor Instrument Cos., Rochester, N. Y. (101B)



PNEUMATIC RELAY transmits output signal proportional to one input signal, with ratio being adjusted by second input signal for proportioning flow.—Minneapolis-Honeywell Regulator Co., Philadelphia 44. (101C)

GYRO MASS METER utilizes principle of gyroscope to measure fluid mass in continuous flow through motor-driven revolving pipe-loop unit.—Control Engineering Corp., Norwood, Mass. (101D)

IMPEDANCE change is measured with uncanny precision by simple electronic instrument using new ionization transducer. Moisture determination is potential application.—Decker Aviation Corp., Philadelphia. (101E)



CONTINUOUS VISCOMETER for process control has ultrasonic sensing element, electronic computer, and temperature compensator.—Bendix Aviation Corp., Cincinnati 2. (101F)

For More Details, Circle Key Number on Readers' Service Card

Continuing Search for Improved "HBC's"

HERE samples, using various emulsifiers, have been subjected to accelerated conditions. Mr. Alikonis is checking them for gloss and bleeding.

AND AIDED by technician, he further evaluates some of newer emulsifiers to gage their performance in retaining the flavor of pastel-colored confectioners' coatings. Another problem targeted has been development of colored coatings that will withstand fading or speckling.

Coming Up—

Better Hard Butter Coatings

Important quality improvements loom as probing surmounts problems in use of new ingredients. Result: Standardized chocolate coatings face stiff competition

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

There comes a time during a scientific development when the "ifs" give way to the "hows"—heralding real advances.

Such is the case, today, with vegetable hard butter coatings in the candy field. The manufacturers primarily concerned have stopped arguing over whether there is a place for these coatings for confections. They now agree there is a place.

Especially pleasing is the freer exchange of production experience on the use of these coatings and closer cooperation among candy technologists searching for still better coatings.

The fact that this stage has been reached was evident in sessions devoted to hard butter coatings at the recent annual convention of the National Confectioners' Assn. Shot-in-the-arm was the sharp rise in cocoa bean prices—from 40 to 70¢ between Nov. 1953 and June 1954.

Few manufacturers of chocolate coatings continue to hold out on the question of "cholocate-type" hard butter coatings. They have become concerned that chocolate, long regarded as a staple item, will be forced into the luxury class and its long-established market will shrink.

Customers Won Over

Reason for the rosy outlook for these coatings is that they have met with consumer acceptance. Witness the many popular bars now made with these compound coatings the year 'round. They would not have been on the market had it not been for recent developments in hard fat technology that have enabled manufacturers to produce compound coatings superior in melting and softening points as well as non-waxy in chewing properties.

In many ways, these fats have properties superior to the old standby —cocoa butter. And the "chocolate-type" coatings may soon be superior to the standardized chocolate in many ways.

Man behind much of the successful development in the improvement of vegetable hard butter coatings is Justin J. Alikonis, director of research, The Al-Chem Laboratory, Inc., Bloomington, Ill. He has steered much of the researches.

These hard butter coatings are not new. Bakers stole a jump by using them over 40 years ago to coat cookies and crackers. At that time, they comprised 8-15% cocoa powder (practically given away, since cocoa beans then cost only about 5¢ a lb.), 30-37% shortening, and 6x sugar.

Product, of course, was a coarse cookie base that offset grittiness of the sugar and greasiness of the fat in the coating.

Significant Stride

The Army became interested in these coatings in 1942—but not from a cost standpoint. It wanted a ration coating that would stand up better than chocolate. Trouble with the latter was that under adverse conditions, it turned gray (chocolate bloom) and fat separated.

First attempt was to improve the physical properties of the chocolate coatings. But when researches showed

that cocoa butter's physical properties were limited, there was a refocus of attention on vegetable fats that could be tailormade to give the flexibility desired.

Outcome was the development of fats to make coatings that would not be too soft in the tropics nor too brittle in the Arctic. *And now hard butter coatings can be tailormade to suit any climatic conditions.*

Better hard butters are still coming —those with a room-temperature snap similar to cocoa butter. Now they exceed the palatability of cocoa butter and withstand higher temperatures without palatability losses.

Emulsifiers Do the Job

During more recent stages of combined research by the Army and Al-Chem Laboratories, emulsifiers—½% of sorbitan monostearate (Span 60) and ½% of polyoxyethylene sorbitan monostearate (Tween 60)—were incorporated in relatively high melt fats to improve the stability and increase the palatability of confectioners' coatings.

This was the first time high melt fats could be used in these coatings without sacrificing palatability. Since this development of a heat- and bloom-resistant "chocolate-type" coating, chocolate manufacturers and confectioners have showed great interest in it.

Work is continuing with new emulsifiers, combinations of them, and improved fats. Now there is increased interest in substituting, in these coatings, domestic fats (corn, cottonseed, and peanut) for foreign fats (coconut, palm kernel, etc.) of the high lauric fatty acid groups.

Practically all emulsifiers are being investigated to retain gloss (No. 1 problem of users of these coatings), to improve palatability, and to assure a better "marriage" of vegetable fats with chocolate liquor or high-fat cocoa powders.

Showing promise on the basis of Al-Chem's researches are the new emulsifiers acetostearin, polyglyceryl stearate, sorbitan tristerate, and pure vacuum-distilled monoglycerides. Sought, of course, is a single emulsifier or combination of them to provide foolproof gloss retention and better palatability.

Early this year, Mr. Alikonis reported at a QM Advisory Committee meeting that, of emulsifiers tried to date, ½-1% sorbitan tristerate (Span 65) gave best results when included with emulsifiers now being employed in Armed Forces rations.

Greatest advances thus far achieved have been to make the coatings more palatable. Success has been attributed to the researchers' ability to tie up low- and high-melting vegetable fat fractions as well as foreign fats, like cocoa butter.

To date, best palatability is won through use of coconut fat. However, improvements are coming along with the application of palm kernel fats.

Because the recent limitations on certified oil-soluble colors, it is now possible to use certain emulsifiers with the water solubles to make them compatible with vegetable fats and thus

12 Hard-Butter-Coating Case Problems and Their Solutions

TYPICAL MISSTEPS in initial operations with the new coatings are spotlighted in queries coming in from all over the world to Justin Alikonis.

These dozen cases, taken from his "clinic file," are of particular value in pinpointing common troubles and accenting their remedies—thus showing what to avoid and why.

1 ***Not Using Right Formula*—A Memphis baker's cake coating quickly dried out and cracked. His product lost consumer appeal and he didn't get repeat orders.**

A check showed he was using hard butter fats with too high a melting point. Difficulty was simply overcome by substituting 25% of the high M.P. (melting point) butters with lower M.P. fats.

2 ***Failed to Handle Coating Properly*—A Chicago candy manufacturer was adding 1% emulsifier to his coating only to find that it would not set up during a normal 4½-min. run through the cooling tunnel.**

It was demonstrated that his coating was overheated during the enrobing operation. He was bringing it up to a 130 F. melting temperature, then lowering it to 110 F. for enrobing. Instead, he should have tempered from 130 to 92 F. and then brought the coating up to 110 F. for enrobing.

3 ***Candies Need "Breathing" Package*—A manufacturer of hard butter coatings complained that a customer in the East had trouble with his finished goods becoming moldy soon after they were packaged.**

The package was examined, and it was found that an improper moisture-proof, heat-sealing wrapper was causing moisture condensation and subsequent mold growth. Difficulty was overcome by semi-moisture proof (breathing type) wrapper.

4 ***Error With Cooling*—From California came a candy maker's wire that his finished goods began turning gray about 15 min. after leaving a 50-deg.-F. cooling tunnel.**

Graying was quickly eliminated by merely raising the tunnel temperature to 60 F.

5 ***Moisture Makes Coatings Rancid*—From Holland came a chocolate manufacturer's appeal for help. His hard butter fats were turning rancid in about a month.**

Solution lay in checking processing equipment for water leaks and curbing excessive moisture condensation during operations. This insured against hydrolytic rancidity.

6 ***Choose Fats to Suit Conditions*—An Australian candy manufacturer wanted a coating that would withstand 115 F. "Down-Under" temperatures.**

He was sent Army specifications on 120 F. coconut fat to be used in formulating coatings.

7 ***Coating On Ice Cream Bars Cracked*—A St. Louis ice cream novelty manufacturer dropped into the lab to learn why the coating on his ice cream bars was cracking.**

To avoid this difficulty he was told to use up to 25% plastic coconut fat (84-deg.-F. M.P.) in his normal 76-deg.-F. M.P. coconut fat.

8 ***Coverage Not Right*—A Chicago ice cream manufacturer phoned that he was getting spotty and uneven coating coverage on ice cream bars.**

Mistake made here was in the coating thickening. It picked up excessive moisture from bars. He was advised to thin his coating by adding ½% each of the emulsifiers Span 60 and Tween 60, also to use up all of his coatings at the end of the day's operations.

9 ***Similar Problem*—An Alabama baker was unable to get proper coverage on "moon" pies (coated, circular graham cracker marshmallow sandwiches) without overheating the coating.**

Trouble was corrected by the drip-feed method of introducing coating to enrober. This way, viscosity of coating was reduced without need of additional fat.

10 ***Failed to Remove Heat*—A Canadian processor was troubled by graying of his chocolate-nut bars.**

Cause was attributed to failure to remove heat from the coating during operations. It was remedied by more care in tempering procedures and control of tunnel-cooling time.

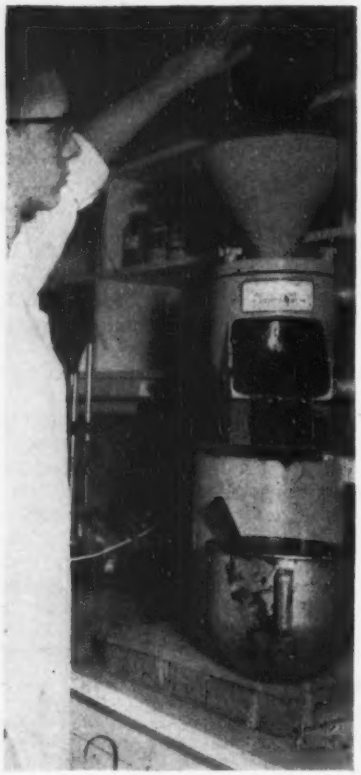
11 ***Didn't Get Flavor Wanted*—A Boston confectioner wrote that the cocoa powder, going into his coating, was not providing the desired flavor.**

He got what he wanted when told to heat the cocoa powder-vegetable fat emulsion to 160 F. This way, aromatic flavors were released from the powder, then readily absorbed and dispersed in the fat. Also, he followed the suggestion that he add a synthetic flavor intensifier.

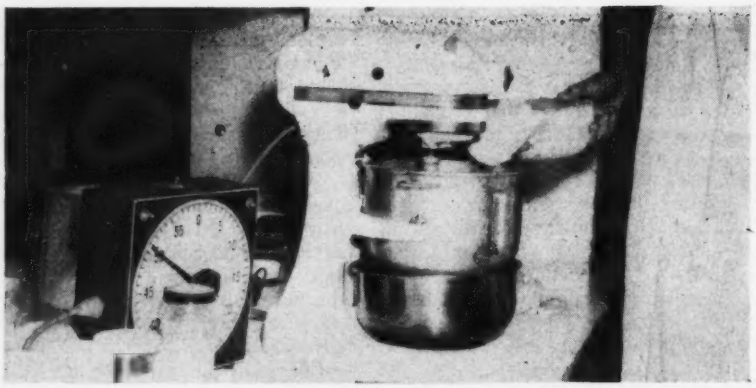
12 ***Trouble With Waxiness*—British candy maker complained that his coatings were waxy in taste.**

It developed that his formula had neither emulsifier nor non-fat milk solids. Waxiness was eliminated by adding 1% Span 60, ¼% Tween 60, and 8% non-fat milk solids.

Pilot Steps in Preparation of "Synthetics"



1 THE MICRO-ATOMIZED toasted cereals are run through this mill with other ingredients to form liquor.



2 SYNTHETIC chocolate liquor is now blended in this small mixer in the preparation of various "chocolate-type" coatings.

3 AFTER this midget enrober coats candy centers, samples are subjected to accelerated temperatures and humidities for later evaluation.

provide a wide range of colored confectioners' coatings. And these colored coatings no longer fade or speckle.

Other Roles of Emulsifiers

These emulsifiers are also doing a better job of retaining the flavor in coating and centers. Good sellers have been maple, butterscotch, mint, and lemon flavored hard butter coatings, correspondingly colored.

Too, emulsifiers are playing a big part in retaining moisture in centers and confections. They improve the moisture-vapor barrier or "package" performance of the coatings.

Not to be overlooked are other branches of the food industry aided by these improvements. For instance, these emulsifiers now permit continuous, non-spotty coating of ice cream bars. Eliminated is the moisture picked up by these coatings during dipping operation.

Problem created by moisture pick-up is that the coating thickens and results in spotty coverage. Where emulsifiers fit into this picture is that they tolerate up to 1% moisture without too much gain in viscosity.

As a further production aid, these emulsifiers permit use of hard butter coatings on warmer candy centers—temperatures of 72-76 F. for the compounds, as compared with 65-68 F. for the chocolate. Advantages are less critical temperatures and more uniform coverage of coating.

The hard butter coatings are more flexible from a temperature and humidity standpoint, hence there is less chance of blooming. Trouble with the chocolate is that if centers are too warm, then it begins to bloom.

In a nutshell, the newer emulsifiers make hard butter coatings more tolerant to such variables as: (1) Temperatures of the centers, (2) speed of belts through enrober and cooling tunnel, (3) temperature of coating, (4) amount of coating over centers, (5) temperature of tunnel, (6) time through tunnel, and (7) temperature and time of finished goods' storage.

On the other hand, trouble with emulsifiers for standardized chocolate coatings is that they have been limited to lecithin and monoglycerides.

Aside from the judicious use of emulsifiers to improve hard butter coatings, other useful developments are taking place.

New Ingredients Coming

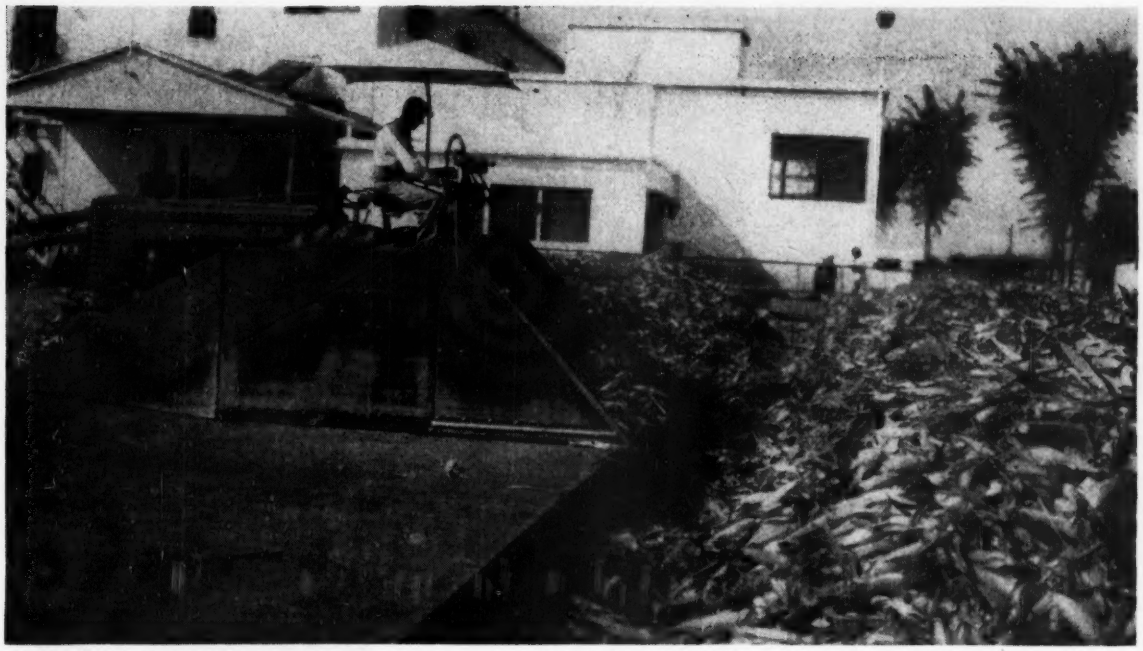
Availability of better non-fat milk solids of more uniform quality has done much to improve the palatability of the coatings. When these milk solids are added in 4-15% amounts, the coatings form pleasant emulsions, or mouth-feeling properties, when eaten.

Also, by adding 2-8% whole milk powder and 4-16% non-fat milk solids, an improved milk-like flavor is imparted. One disadvantage, however, is that the butterfat is likely to bleed from the coating, unless the correct emulsifier is employed.

Being introduced are enzyme-treated whole milks which, when incorporated with these coatings, will bring out a desirable flavor described as "cow-like."

Toasted cereal grains—cottonseed meal and soya flour—provide palatability and additional nutritional value.

(*Turn to page* 198)



NEW METHOD of feeding corn into cannery is mere "1-2 technique" requiring only three men. First, hydraulic-tilting trucks dump corn on apron, then special tractor speedily sweeps it onto conveyor going into plant.

Easy Does It

At *This* Receiving Station

System *Simplified* . . . Bottlenecks *Abolished* . . . Labor *Lowered*

FE STAFF

The Green Giant Co. today is accruing a number of benefits as a result of its new highly efficient system of unloading corn from trucks and then conveying it into the cannery.

Most significant are the savings in time and labor. Three men now carry out work that formerly required 17 men. What's more, there's no longer any waiting and consequent bunching up of trucks bringing corn from the fields. Actually, the new method has cut down on the number of corn-hauling trucks needed.

Thus, where queues of up to a dozen trucks once were common, corn movements now "click off" with no delays. Also eliminated are the yard wagons formerly used for temporary storing of corn, along with the maintenance and repair needed for these units.

Furthermore, this simplified system eliminates former multiple handlings —either dumping truckloads of corn onto conveyor going to cannery or reloading wagons and then dumping from them.

And another thing: Bruising of corn is significantly reduced.

Old Method Was Difficult

But let's tell the story of these efficient changes from the beginning, using Green Giant's Winsted, Minn., plant as an example:

In the former method of feeding 30 tons of corn hourly into the cannery, two trucks were simultaneously spotted on a 5-in.-thick 22x35-ft. concrete unloading apron. Trucks' front wheels were then raised with the aid of a steel sling and overhead chain hoist.

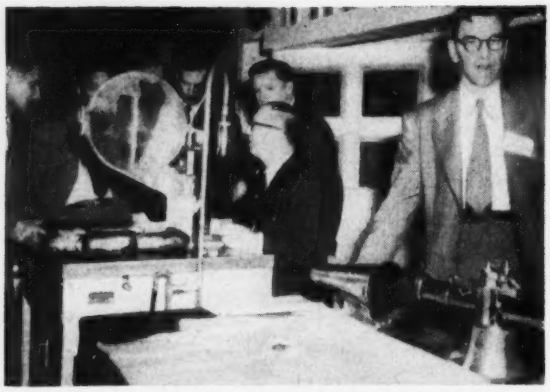
Then two men, using forks, helped unload the corn from the trucks and also control its flow onto a flight conveyor going directly into the can-

(*Turn to page 215*)

This ▲ Replaces These ▼

OLD WAY required 17 men, 3 tractors, and 70 wagons. Corn either was manually unloaded (top photo) onto conveyor carrying it to processing lines, or it was reloaded into yard wagons (above) for storage, then later fed to cannery.

LOW-COST, 2-head vacuumizing-sealing machine for sliced meats includes inert-gas attachment. Featured also is specially designed conveyor system for feeding pouch-packed meats to sealing machine and for carrying away finished packages.—Standard Packaging Corp., N.Y.C. (106A)



WORKING in combination are pneumatically operated stuffer (right) for butts, shoulders, hams, etc., and roll-fed end-closing metal clipper (left). Maker of Stuffer: Interstate Tool Co., Inc., Chicago. (106B) Manufacturer of end-closing unit: The Globe Co., Chicago. (106C)

New Packaging Equipment Viewed at Meat Show

Other Improved Units Displayed

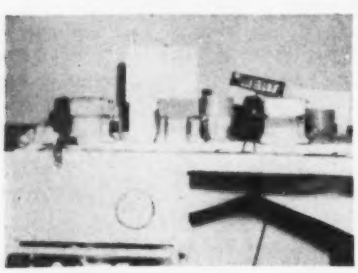
OF 22 NEW UNITS exhibited at the recent American Meat Institute meeting, almost half are for packaging. It is also noteworthy that more than half of these packaging units are designed for multi-function operation.

Among the versatile units is one that packages sliced meats or other food items in inert gas or vacuums. Another chub-packages meats and cheese spreads and other products by forming, weighing, filling, and metal-clip sealing at a rate of about 30 per min. A third is a 120-per-min. carton forming and lining machine built to set up a variety of carton sizes.

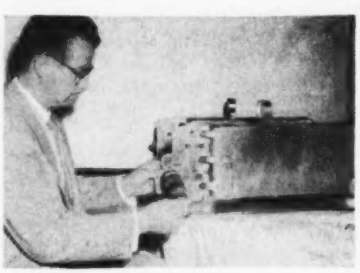
Other equipment shown included two sausage link and pattie-forming machines; a newly designed silent cutter; continuous breading, frying, and tray-stacking equipment; and a portable plant-cleaning unit.

Time-saving and cost-saving techniques included a new method of insulating retorts, rapid moisture and fat tests, dielectric heating, automatic turning of bellies for inspection, and speedy winding of wieners over a special smoking rack.

NEW chunk-wrapping technique involves mitre-box cutting of items into five 12-oz. chunks, tight-wrap unit for bagging chunks, and table-mounted combination heat-sealer and label applicator. Latter's speed is 7 packages per minute. Maker: Visking Corp., Chicago. (106D)

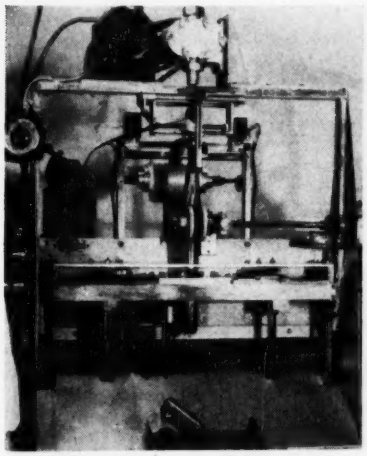


AUTOMATIC pressure-sensitive label dispenser takes roll-fed paper that is fed over thermostatically controlled heat plate (which loosens label onto fabric belt). Unit has space and speed control. Operated either continuously or single-cycle. Maker: Allen Hollander Co., Inc., N.Y.C. (106E)

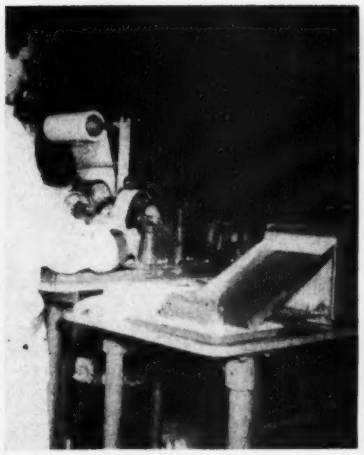


END-CLOSING UNIT applies reel-fed combination plastic and aluminum strips to casing-packaged meats at a rate of 18 packages per min. Strips are pneumatically applied at pressures up to 120 psi. Makes 1st and 2nd end closings. Maker: The Morley Co., Portsmouth, N.H. (106F)

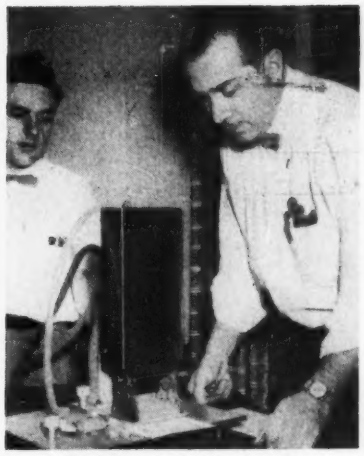
PNEUMATICALLY-operated sealer applies new U-shaped clips to casing-packed boneless meats. Rate: 5 packages/min. Features self-locking and releasing clipping head. Air pressure pulls jaws to compress meat in casing against sealing head. —Global Indus. Mach'y. Corp., Brooklyn. (106G)



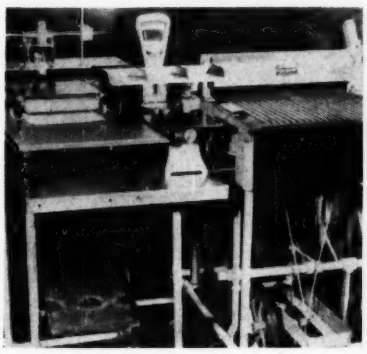
CHUB packaging machine automatically forms, fills, and snugly wire-clip-seals 1,800 packages hourly. Accurately fills and packages chubs weighing 4 to 16 oz. in clear or printed Saran or other thermoplastic films. Manufacturer: Kartridg-Pak Machine Co., Chicago. (107A)



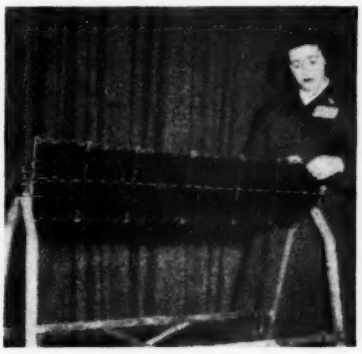
COMBINATION unit features (1) power-driven belt for hand twist-wrapping meat items in heat-shrinkable film and (2) shrinker (foreground). Immersing for few seconds in shrink-tank's 210-F. water tightly fits film to product. —Miller Wrapping & Sealing Mach. Co., Chicago. (107B)



SEMI-AUTOMATIC printer handles 30 pouches, casings, and cartons per min. Material is hand-fed to machine, which automatically ejects printed pieces. Prints product name, ingredients, prices, etc. Adjustable for various sizes. —Oster Tool & Die Corp., Chicago. (107C)



LOW-COST foursome unit sheet-cuts roll-fed film. Sliced luncheon meats are next scaled, wrapped, and packaged, followed by sealing, and code dating. Also, if desired, label is applied. Sheeter feeds to girl up to 21 per min. —Miller Wrapping & Sealing Mach. Co., Chicago. (107D)

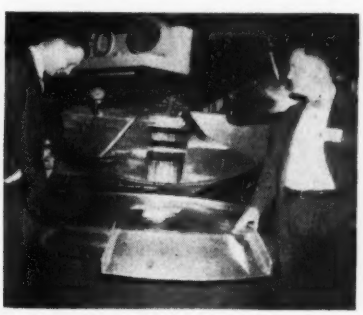


TIME-SAVING system for twisting wieners on specially designed, stainless steel wire rack speeds worker output to 500 lb. hourly. Permits vertical hanging of twice as many franks on smoke cages as well as better smoke penetration. Speeds linking.—Twistick Co., Seattle. (107E)

ECONOMICAL peeler strips casings off wieners at rate of 600-700 lb./hr. Portable, compact unit operates on 115v. current and uses pressure of 30-40 psi. Cutter blades (costing but 15c) are replaced once a week with normal use. Doesn't scar wieners. —Tee Cee Mfg. Co., Cincinnati. (107F)

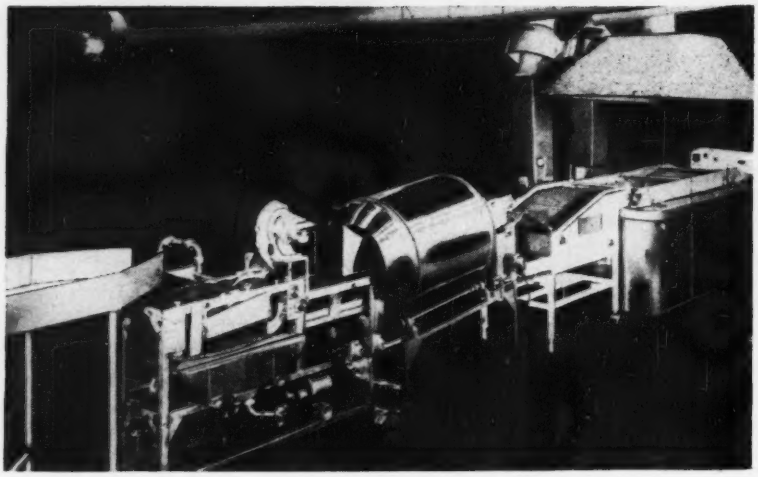
DISPENSER molds six skinless sausage links at one time and ejects them onto paper sheet and then a packing conveyor. Adjustable to produce links from 2½ to 5-in. lengths, it handles up to 500 lb. of meat hourly. Paper-dispenser is built into machine. —Dohm & Nelke, Inc., St. Louis. (107G)

AUTOMATIC molding machine, hooked up to stuffer, forms eight 1-oz. sausage links or four 2-oz. patties at a time. Molded sausages are ejected right into window-type cartons at rate of 1,000 packages/hr. Unit is adaptable for molding other items. —Basic Food Materials, Inc., Vermilion, O. (107H)



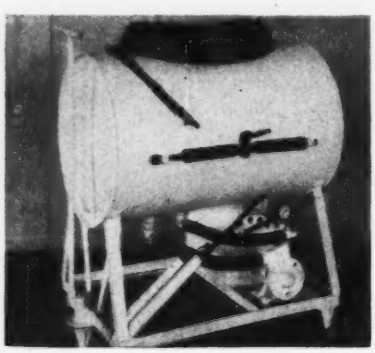
ADVANCED silent cutter has: New knife arrangement for faster cutting, added sanitary features for cleanliness, hinged lid that swings up to make mixing bowl easily accessible, and special transmission to drive bowl separately. Manufacturer: The Globe Co., Chicago. (107I)

DIELECTRIC unit pre-heats meats to speed frying. Available for continuous operation with electrodes above and below conveyor feeding fryer. Displayer: Modern Maid Food Products, Inc., Jamaica, N.Y. (108A)



FULLY AUTOMATIC breading line batter-dips meats, fish, poultry, and other items. Products are then automatically fed into revolving breading drum. Coated items next discharge from breader and go to a continuous fryer. Fryer is equipped with circulating fat system to maintain level. Fried products are then automatically tray-stacked. —Downyflake Breader Mix Div., Doughnut Corp. of America, N.Y.C. (108B)

NEOPRENE-coated, woven fabric abdominal apron is designed to prevent workers from cutting stomach or thighs with knife. Sanitary, MID-approved apron does not become saturated with grease or water. Sizes: 14x18 in. (3-ply) and 18x20 in. (4-ply). —C. R. Daniels Co., Milwaukee, Wis. (108C)



PORTABLE hot-spray unit uniformly cleans wide and recessed areas at ejection rate of 2 gal. of solution per min. Three-way cleaning is provided by vigorous detergency and solution heat-applied in wide swath under equal pressure. It will also strip paint. Maker: Oakite Products, Inc., New York City. (108D)

WENDWAY conveyor (20 in. x 3 ft.), attached to end of bacon-skinning machine, eliminates manual turnover of bellies for inspection. Bellies are automatically turned at conveyor discharge. Easy-to-clean conveyor also eliminates former jam-ups. Displayer: Townsend Engineering Co., Des Moines, Iowa. (108E)

FAT and moisture contents of meats can be rapidly determined in 30 min. by this equipment. Test methods devised are suitable for operation by non-technical personnel and require little space. Developed by American Meat Institute Foundation for rapid, in-plant control of quality. (108F)

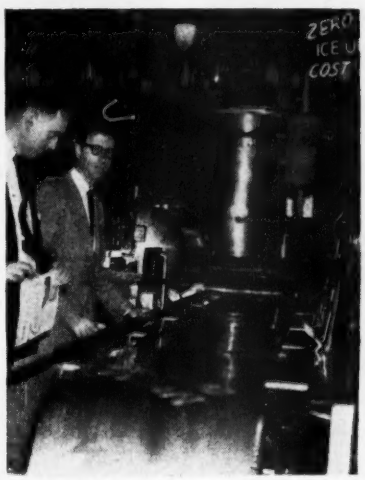
ADVANCED insulation system is designed to cut, by about one-half, steam losses of uninsulated retorts. Economical insulation is easy to install, does not pick up water or grease, and is insect- and rodent-proof. Displayed by American Meat Institute Foundation, Chicago. (108G)

Poultry Show Highlights

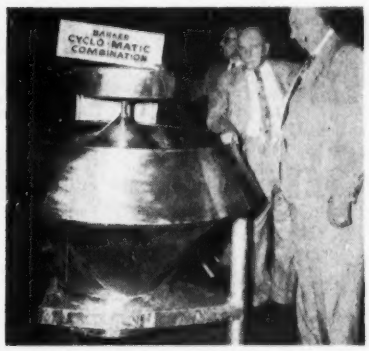
On view at National Poultry, Butter & Egg. Assn. Exposition in Chicago were newest bagging, gizzard peeling, picking, eviscerating, and grading units

NEW, SHRINKABLE "poly" bag provides snug-fit cover for eviscerated turkeys. Printed bags (2 mil.) are twisted and stitch-sealed, then shrunk after brief immersion in dilute 215-F. propylene-glycol chemical solution.—Central States Paper & Bag Co., St. Louis. (109A)

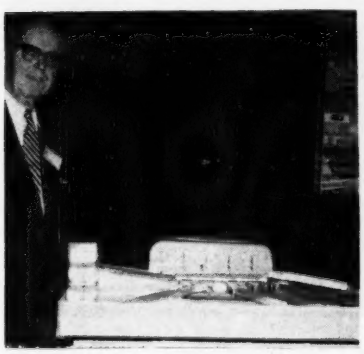
PEELER (table-type model) Handles up to 500 gizzards an hour. Cleaned and washed, the gizzards are slid over a pair of spiral rolls, and lining is removed in mere fraction of second. Featured are special easy-to-clean, case-hardened chrome-plated peeling rolls.—Kent Indus., Chicago. (109B)



SANITARY, easy-to-clean steel-belt eviscerating table features water-flushing stainless trough along entire length. Unit is of heavy-duty construction, completely enclosed, and it has variable-speed drive. Belt supplied in 20-in. width and 15, 22, and 30-ft. lengths.—Kent Indus., Chicago. (109C)



BATCH PICKER defeathers turkeys (6) or chickens (15-20) each 30 sec. Unit comprises 50-in. outer drum and 16-in. inner one. Latter, driven by 3-hp. motor at 360 rpm., has 14 rows of 20 rubber fingers (¾x4 in.). Circular spray on top rim of outer drum washes down feathers.—Barker Poultry Equipment Co., Ottumwa, Iowa. (109D)

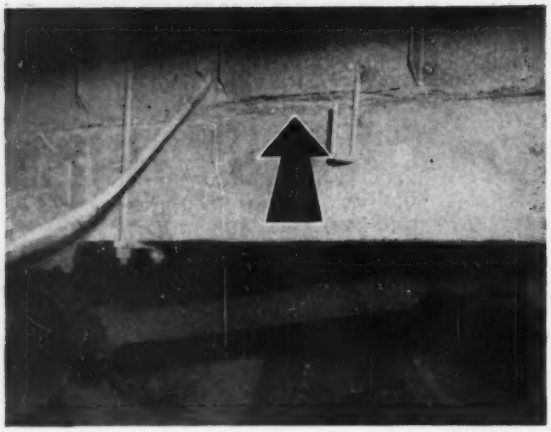


COMBINATION candler-grader intermittently sorts eggs into five sizes. Unit consists of four net-weight scales lowered by weight of eggs, which are then discharged onto rubber tracks. Packing table has dividing plates that spread to prevent damaging of eggs.—S. Eisenberg & Co., Chicago. (109E)

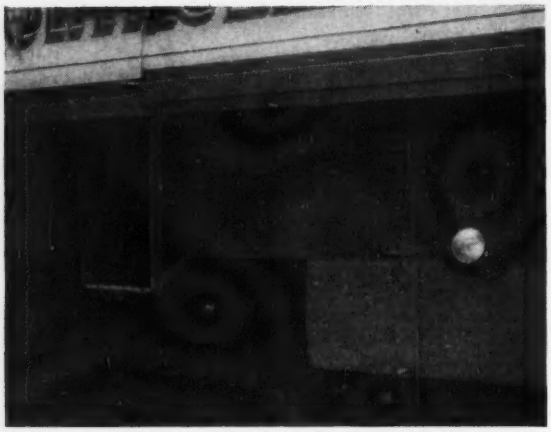
THIS GRADER has ten sets of scales and totalizers for sorting and counting eggs into double sets of five sizes. Capacity: 20 cases/hour. Unit also features take-away conveyor and self-feeder—with up to 3 doz. eggs put on conveyor table at a time.—Otto Niederer Sons, Inc., Titusville, N. J. (109F)

ANOTHER GRADER sorts eggs into 5 sizes. Rate: 7 cases or 210 doz. hourly. Candled eggs ride over power-belt take-off and onto pre-set, counter-balanced scales. Eggs of proper weight for specific scale depress scale and roll onto packing belt.—Southwest'n Equip. Co., Chicago. (109G)

For More Details, Circle Key Numbers on Readers' Service Card



BEFORE waterproof floors were installed, wood stringers rotted (arrow), and under body metal rusted.



AFTER making floors leak-proof with flanged-up stainless steel, rusting diminished, rotting practically ended.

Engineering of Truck Bodies Shrinks Delivery Costs

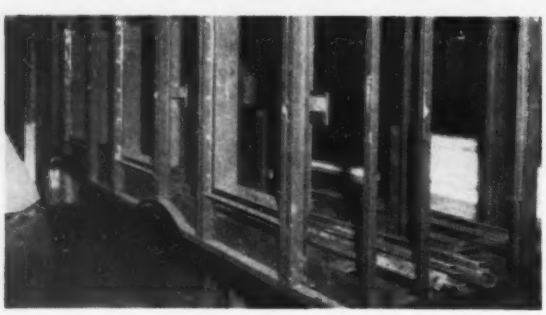
Fleet operation is simplified and product protection assured by special designing of bodies to fit the job. Also, accident damages are reduced, repair costs cut

FE STAFF

Though some of the changes in truck-body design engineered at Abbott's Dairies, Inc., Philadelphia, are quite minor, while others are fundamental departures from conventional body structures—all contribute to more efficient, safe, and economical truck fleet operation.

Also, considerable more capital outlay was required than for conventional bodies. But savings in fleet operation have more than compensated.

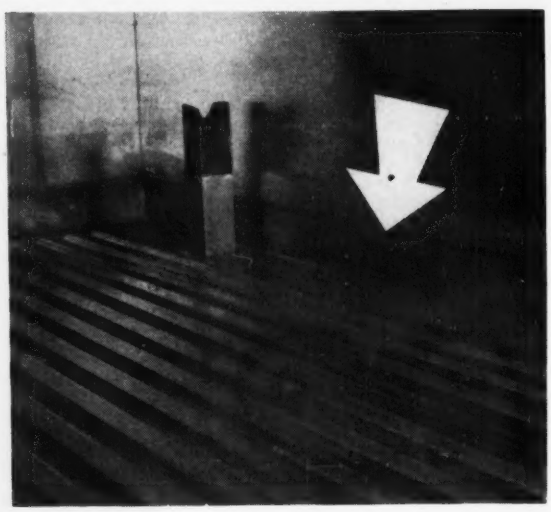
Here are a revealing dozen of the innovations in design of ice cream truck bodies, and the values gained by the improvements:



1. Extra Payload in Lighter Bodies

Framework of ice cream trucks is made of aluminum, so also are sides and top. Three advantages are gained: Construction is speeded, body weight is reduced, and avoided is deterioration of structural members due to rusting and rotting.

Weight savings on truck bodies and trailers is as much as 1,000 to 6,000 lb. Operating savings range as high as 2c. per mile.



2. Novel Floor Construction

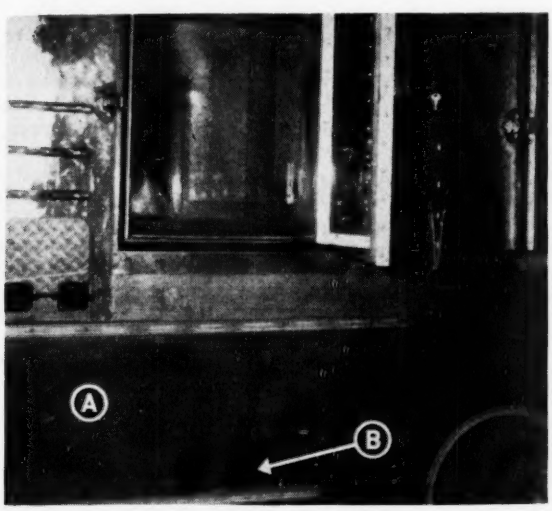
Truck floor is one-piece construction with sides and ends flanged up tray-like (arrow in photo) to a height of approximately 6 in. Thus, water from defrosting or from any other source is prevented from reaching side-wall insulation or that beneath the floor.

Since insulation separates the floor and the bottom of the truck, the metal floor is prefabricated and lowered in place, between frame uprights, after the bottom insulation has been installed.

3. Heat Loss Avoided by One-Piece Top

Tops of refrigerated ice cream trucks were formerly fabricated of aluminum sheets. Sooner or later, however, workers stepped on the roof of the truck. When this occurred, the least that happened was a dent and crushed insulation. Too often, however, seams joining the metal sheets (which make up the roof section) were opened. Then moisture leaked in through the ruptures and thus reduced efficiency of the insulation.

Now, however, since special aluminum sheets are rolled to the specifications required to fabricate a one-piece truck top, there is no longer any chance of leaks that might reduce insulation values of the roof.

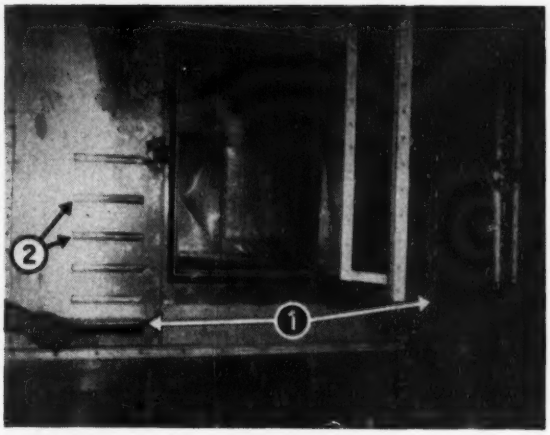


4. Less Repairs After Minor Accidents

When a truck is damaged, whether on the road or in the garage, most frequently injured part is the skirt—the side extension below the body frame.

In conventional bodies this section usually is constructed by extending sides below the floor level. Thus, damage to the skirt section of a conventional body usually requires extensive repairs of the sides.

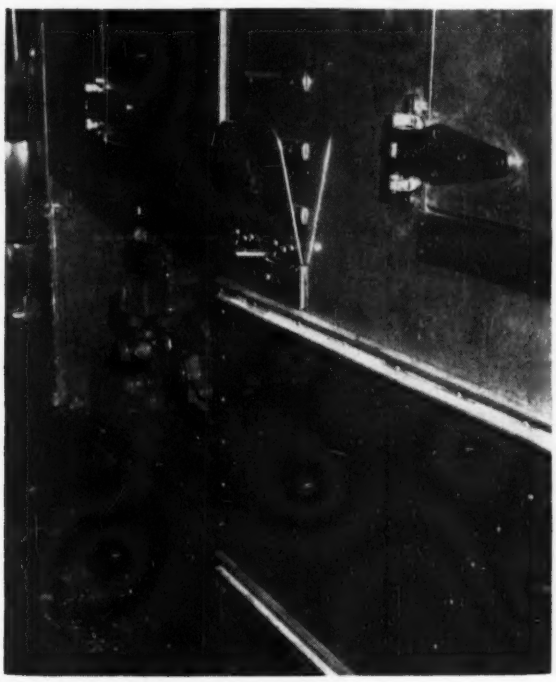
When skirt—(A) in photo—is separately fabricated in sections and attached to the body, damage to a section of the skirt requires no repairs to body sides, and only minimum repair or replacement of a skirt section is entailed. Below the side-entrance doors in truck body, a portion of the skirt is cut away above the sturdy bottom reinforcement. Thus provided is a safety step (B) to aid driver in reaching into the interior of the body.



5. Disappearing Loading Platform

On both sides of the six doors to the refrigerated body section, small spring-raised shelves—(1) in photo—are attached. These provide a platform on which to rest package or container when loading or unloading. However, because of the spring return, these loading aids do not project out horizontally except when held down or weighted by a container.

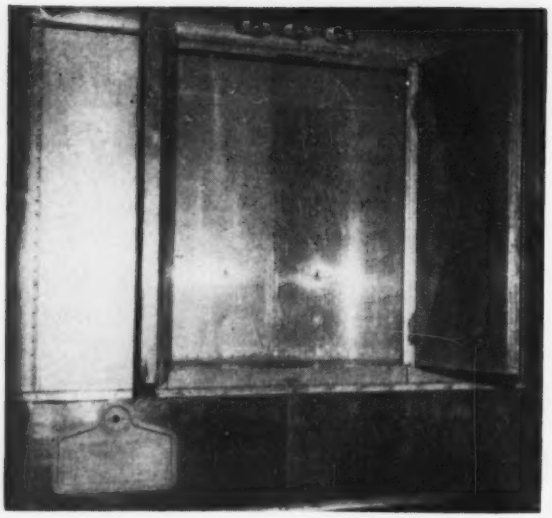
To prevent containers that are temporarily placed on the shelves from marring paint on the sides of the truck, polished aluminum strips—(2) in photo—are attached to sides above the shelves.



6. Unit Made Accessible

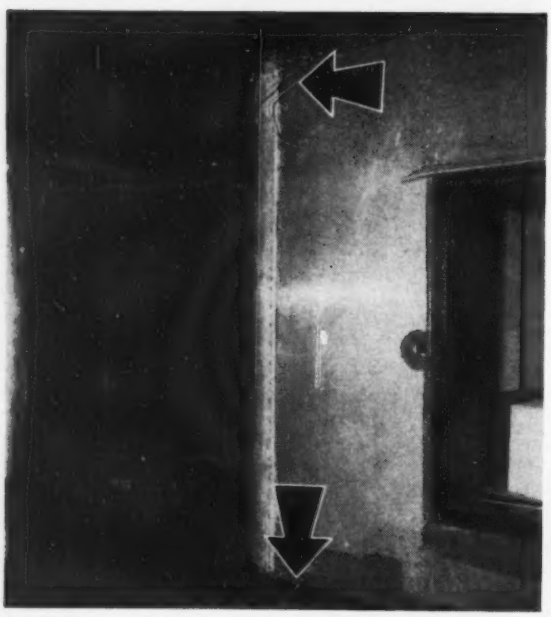
Refrigeration compressor and motor of heavy stationary type are located in a compartment behind the skirt and beneath the forward end of the truck body on the driver's side.

Though protected in compartment behind closed doors, unit thus is readily accessible for maintenance and repair operations.



7. Non-Refrigerated Compartment

Special arrangement is provided for handling ice cream in dry-ice packages. If quartered with the other frozen products, these packages, which require no refrigeration, might be damaged or at least interfere with loading and unloading of ice cream. Therefore a separate non-refrigerated compartment, designed to hold a one-trip supply, is provided at the rear of the truck. From here, these packages can be removed without refrigeration loss.



8. Ends Shorts in Truck Light Wires

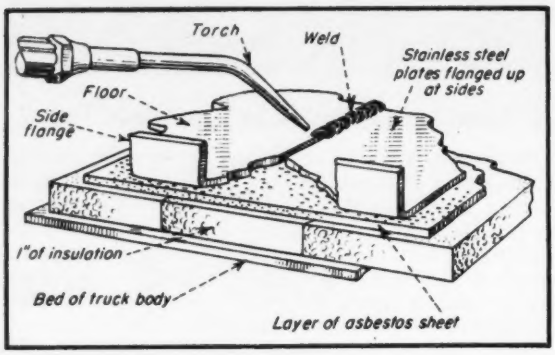
Attaching and wiring the legally required lights near the roof of insulated refrigerated trucks presented real problems, until the present system was adopted.

If wires are strung on the outside of the truck they are unsightly. Also, so placed, they interfere with regular truck clean-up and in addition may be easily shorted or ripped off.

Most satisfactory route to roof height for leads from beneath the truck body, proved to be through the insulation in the sides or the end of the truck. So this location for wire uprights was chosen.

However, it was necessary to prevent moisture entering the wire inlet and outlet. If any moisture should penetrate to the insulation, costly heat loss would result. Also, wire would then be more easily shorted.

Accordingly, metal tubing was used to sheath wires throughout their travel through the sides of the truck. To prevent moisture penetration to the insulation, these tubes were sealed at the points where they enter and leave the metal sides.



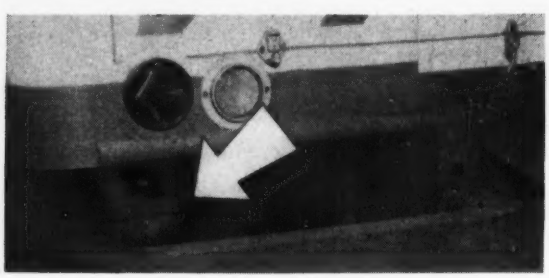
9. Parts Welded in Place

Floors of bulk and wholesale delivery trucks are fabricated of stainless steel sheets, welded into one piece and, like those of the ice-cream trucks, flanged up tray-like at sides and ends to prevent water reaching insulation. Corner drains and doors provide exit for accumulated water.

Floors of these large units are not prefabricated, but instead are welded in place after bottom insulation has been laid.

Experiments with many procedures finally developed a satisfactory method of such floor-sheet welding without damaging the insulation beneath:

After bottom insulation is laid, surface is covered with a layer of sheet asbestos (see sketch). Stainless steel floor sheets then are positioned flat on the surface of the asbestos and seams thus formed welded. Insulation is not injured, and the steel floor does not warp.



10. U-drain Curbs Temperature Loss

At minor cost and with little effort, a source of temperature loss in refrigerated truck bodies was effectively blocked. Here, the saving was accomplished by nothing more complicated than attaching a 180-deg. fitting (see photo) on the end of the drain pipes.

Formerly, either cold air passed out of the water drains or warm air rushed in. Now the U-bends provide water

(Turn to page 191)

Acting the Actual Roles Is Key Training for Supervisors

Real management problems are attacked by foremen when GF plant assigns them front-line parts in special "incident"-type program . . . Cite notable strides in improving their understanding of human relations, augmenting their judgment of work situations, and sharpening their business sense

DONALD L. MARSHALL

Assistant Personnel Manager, Atlantic Gelatine Div., General Foods Corp., Woburn, Mass.

Only a year ago, our supervisory training picture at Atlantic Gelatine Div. of General Foods Corp. was just "so-so."

On the one hand, we were ready to confess that our instructional programs had misfired insofar as creating enthusiasm and improving job performance were concerned. But on the other, we could point to the fact that our experience had begun to clarify certain areas calling for development.

We knew the time had come to work out and install a really efficient program designed to fill the needs in super-

"INCIDENT" TECHNIQUE IN A NUTSHELL

1. **Studying the Incident**
2. **Fact-Finding Phase**
3. **Defining the Issue**
4. **Making Immediate Decisions**
5. **Evaluating and Generalizing**

True Fruits

IN EVERY SEASON

ALVA natural fruit flavors have a reputation for better taste and better utility for these reasons:

1. **Most of our true fruit extractions are processed through essence recovery distillation equipment built to our own specifications. This special processing assures the retention of even more of the light fugitive esters so difficult to hold in normal extraction procedures.**

2. **Storage facilities are maintained under ideal control conditions, improving the life of flavors and guaranteeing freshness in each delivery.**

3. **Through the years ALVA has developed procedures for handling fresh fruit which assure 100% purity.**

ALVA true fruit flavors are ideal for every use, and the ALVA laboratories are eager to help with recommendations and samples for every true fruit problem.

VAN AMERINGEN-HAEBLER, INC.

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Alva FLAVORS

visory personnel group training. And we say group training because, like others, we had found it generally impractical to provide individual instruction at the foreman level.

The top promise was in group dynamics—which has now specifically borne fruit for us in the so-called "incident" type of training.

But first let us brief the situation at our plant—

Management Structure

In the gelatin plant we have a total personnel of about 450. Of this number approximately 325 are hourly-rated workers.

The "supervisory force" selected for training consists of approximately 50 representatives of management. For this group of 50 supervisors we hoped to provide a group training program that would result in:

1. An improved understanding of human relations, particularly in the area of appreciating people's feelings and attitudes in the work situation.

2. More ability to apply practical judgment to situations, taking into account any human relations elements involved.

3. Better comprehension of the functions of the business beyond the individual's immediate responsibility, thus providing improved coordination.

In recent years, lectures, conferences, and other techniques, had been employed as a means of training. But reluctantly we concluded that our average supervisor was not greatly interested in such training, and accordingly had not noticeably benefitted.

Approaching the Problem

We therefore faced the fact that the situation might involve psychological factors—such as those emphasized by James R. Surface in his recent article, "Resistance to Training."[1] However, we hoped it would be possible to shape up a more stimulating program that would pay off in results.

It was at this time that the personnel staff became familiar with the "incident process" form of instruction currently used in seminars at the Massachusetts Institute of Technology. Granted, this system was not to be considered a package cure-all. But we decided that if it could be effectively presented the method might be exactly what we needed.

Accordingly, we delegated the personnel department to draw up a program to employ the new procedure. Personnel was also made responsible for directing the meetings.

What It Is

Developed by Prof. Paul Pigors of MIT, the incident process is a case-study method employing a step-by-step pattern such as is followed in making decisions in actual work situations.[2] There are five phases—

1. Members study an "incident" described in a written statement distributed to each member of the group. Detailed is some event taken from a case—preferably one involving a situation in which an equitable decision is difficult to reach. In working on this problem, members are assigned to act specific case roles, such as arbitrator, foreman, steward, etc.

2. Next step is fact-finding. The leader is thoroughly interviewed in order to assemble enough information to recreate the entire situation. At the end of this phase the key facts are summarized.

3. The central or real issue is then decided upon.

4. Each member now writes his own brief decision, accompanied by an outline of his supporting reasons.

5. Finally, the group discusses the case in general terms to see what can be learned from it—looking toward prevention of similar difficulties in the future.

In using this method, there are three major positions to be filled. First, there is the *leader*, who is charged with the responsibility of selecting a case for study, preparing an effective teaching plan, and then leading the discussion in such a way that all members benefit.

A second person acts as official *observer*. He takes notes and writes a report on the session, including not only an objective digest of what took place, but also his own comments and recommendations.

Third, there is the *program administrator*, who directs the program and retains executive responsibility for all work done by the group. This last function was performed at Atlantic Gelatin by a member of the personnel department.

Preparing the Program

Initially, the personnel staff outlined a program to cover twelve 2-hr. sessions, one each week for twelve consecutive weeks. Plan called for studying a different case at eleven of these meetings, with the last session reserved for the evaluation by the group of the results of the program.

For case material we decided to experiment both with personnel administration situations taken from arbitration reports,[3] and with cases emphasizing different business functions taken from various other sources. We also decided that most of the cases should be actual situations, with only a couple of hypothetical cases inserted as an experiment.

Considerable thought was given to the matter of selecting and training the leaders. It appeared that ideally each trainee should have the opportunity to serve both as leader and observer.

However, we decided to start off with leaders from outside the group, for two reasons:

1. Our group would be made up largely of first-line foremen, many of whom at the start would not feel qualified to present a case.

2. It seemed essential to have some of the cases emphasize certain business functions with which the group selected was not familiar.

Then after the program was sufficiently under way to indicate procedure, we were ready to ask for volunteer leaders from inside the group.

Subsequent step was to help our selected leaders choose and prepare cases. Though each was given considerable briefing on the method, in most instances a "dry-run" was also conducted on the fact-finding phase in order to insure that the leader had in his possession all the necessary facts of the case.

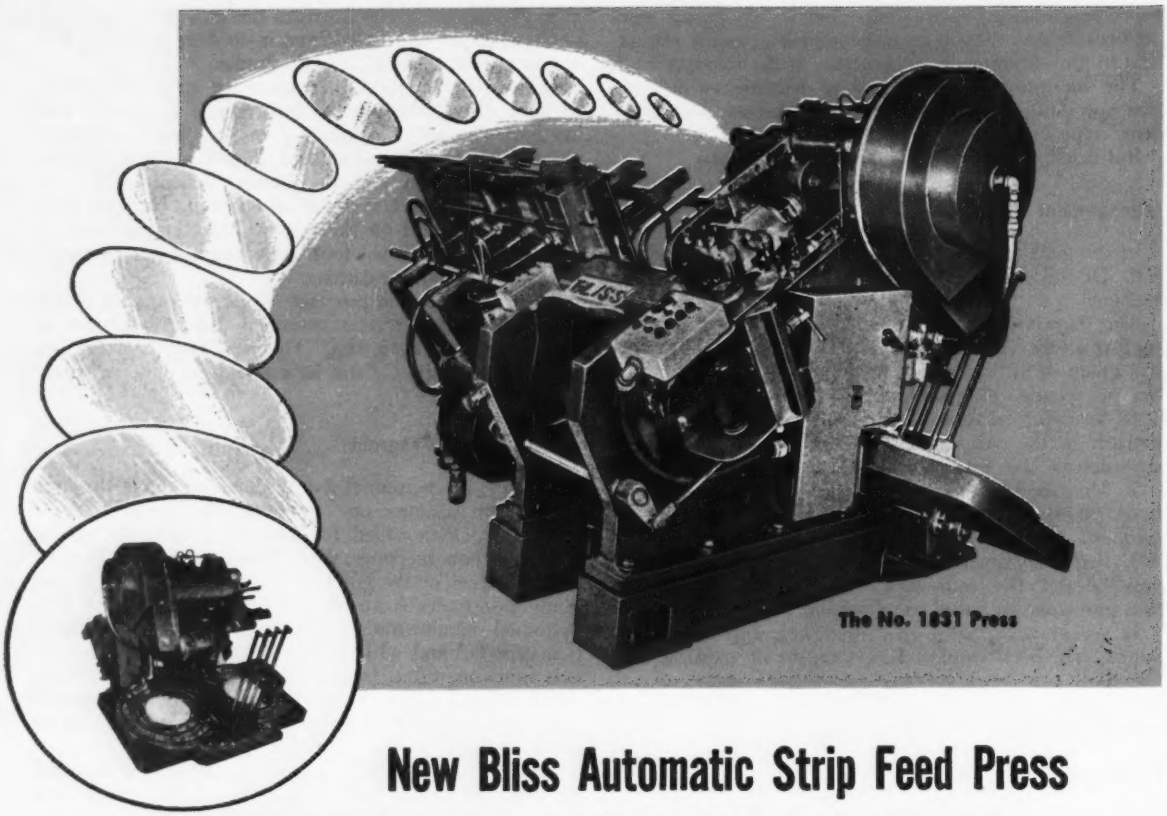
Our program, as finally conducted, is detailed in an accompanying panel.

Selecting the Group

Frankly labeled as an experiment, this training program initially was administered to ten supervisors selected from the manufacturing and engineering area. The plan had been briefly described at a supervisors meeting, after which the call for volunteers went out. Twenty-two responded, and from them the ten were chosen—at random.

Fortunately, this group was a fairly representative cross-section of manufacturing and engineering supervisors, particularly in its job make-up. Included were a shift production superintendent, maintenance foreman, utility supervisor, stores supervisor, and six production foremen from various departments.

In terms of personnel background, the average member had served as a supervisor for about six years, prior to



New Bliss Automatic Strip Feed Press will deliver more than 300 strokes per minute!

From the ground up, it's been engineered to slash maintenance needs and boost production speeds

You wanted speed in your strip feed presses—reliable speed! And here it is: to 300 strokes per minute (or more, depending upon can size), more than 18,000 strokes per hour all day long—without time-wasting stoppages for re-adjustment and repair.

One of the major features of the new Bliss press is its precision counter-balanced crank-shaft and feed bar crank which holds vibration to an almost irreducible minimum and thereby permits smooth, quiet operation at high speed.

Other features: combination disc friction clutch and brake—permits instant starting • feed bar is driven by crank instead of lever—and has adjustable fingers • a bigger bolster plate • no idle strokes between strips, if desired • slide stops instantly at top of stroke.

You'll want to know more about these developments. For complete details, write, wire or phone

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SLITTERS

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a millwright who was discharged after he refused to per-

In agreeing upon an issue, the group came to grips with

COMPREHENSIVE PROGRAM

It Took Trainees Into Numerous Phases and Functions

Session 1— **Leader: Personnel manager. Case: Arbitration, involving performance of hourly-rated work by a foreman.**

Session 2—**Leader: Industrial engineer Case: Hypothetical, involving compensation of an employee under a company suggestion plan.**

Session 3—**Leader: Assistant personnel manager. Case: Arbitration, covering work assignments among various maintenance classifications.**

Session 4—**Leader: Manufacturing superintendent. Case: Hypothetical, concerning the production schedules.**

Session 5—**Leader: Manager of manufacturing and engineering. Case: An actual quality-control problem in a disguised setting.**

Session 6—**Leader: Personnel manager. Case: Arbitration, involving promotion of a more qualified worker out of seniority order.**

Session 7—**Leader: Sales manager. Case: An actual sales credit problem in a disguised setting.**

Session 8—**Leader: Group member. Case: Arbitration, involving a situation where an employee had been cited as having communist affiliations.**

Session 9—**Leader: Group member. Case: Arbitration, concerning outside contracting of work that employees had previously performed.**

Session 10—**Leader: Purchasing agent. Case: Actual purchasing problem, disguised setting.**

Session 11—**Leader: Controller. Case: Actual inventory problem at company.**

Session 12—**Evaluation of the program by participants.**

which he had been employed as an hourly-rated man. There were only three members whose education went substantially beyond the high-school level.

Participants Enthusiastic

It was immediately apparent that interest in the program, which got under way early this year, was at a very high level. Somewhat to our surprise, this interest continued very high throughout the entire twelve weeks. In fact, attendance was 100% at each of the sessions, even though eight members were participating on their own time.

Also, the members assembled early and called out to the program administrator with such expressions as "Let's get going."

Participants were so stimulated by the entire experience that they would discuss the sessions among themselves throughout the week, and they jokingly urged the member who served as observer to "go easy on me in that report of yours."

A more complete picture can be gained by following it in terms of the five phases of the incident process.

1—Studying the Incident

All leaders were successful in preparing the "incidents" which, while brief, provoked specific curiosity and interest. Here we had realistic starting points from which the members could come to grips with pertinent problems.

2—Fact-Finding Phase

The tempo in the fact-finding step varied considerably from session to session, depending upon the case. Definite improvement in the group's ability was noticeable as the program progressed. Members seemed most efficient when they worked on cases collectively as impartial arbitrators.

Obviously these were situations in which they personally could feel at home, and so enjoy accordingly. In analyzing cases from this viewpoint, their questions were more apt to be pertinent and searching, thus their teamwork improved.

However, when tackling unfamiliar situations—such as when serving in the roles of purchasing agent, industrial engineer, and others—the members frequently had to plod along fairly slowly, listening carefully to the questions asked and the leader's answers in the hope of finding clues on which to base conclusions.

It was interesting to note the rapid increase in the number of questions aimed at exploring the feelings and attitudes involved in a case. As one trainee put it, "The human element certainly is a big factor."

At the conclusion of the fact-finding phases, the leader always asked a member to provide a summary of the key facts. And our experience here was gratifying. After only a few suggestions as to form, members learned to make effective summaries, thus setting the stage for the next step.

3—Defining the Issue

Although in our program the nature of definitions varied according to the case and role assigned, the group became quite efficient in pinning down the central issues. This step is not difficult when a group has done a good job of fact-finding. As one foreman commented, "After the facts are uncovered, the issue appears plain.

4—Making Immediate Decisions

This part of the method involves writing a brief, practical decision and outlining the supporting reasons. It was in this sphere of reasoning that the group appeared weakest in the early sessions, and improvement in this step has been most difficult to detect.

Bearing in mind the educational background of members and the short time allowed, the slow progress here is probably understandable. True, members would often get a "feel" for deciding one way or the other, but they would have difficulty in working out and expressing reasons.

This part of the process included another interesting feature: Whenever there was a split in the decisions (as there was in nine sessions), the leader asked the members to group into divergent parties and consolidate their respective opinions, then elect a spokesman and return prepared to present a strong case in support of their decision.

Although the ensuing debate was limited to about five minutes, this feature was particularly relished by the participants. We are convinced that in addition to pointing up the conflicting views, the experience members gained as spokesmen made this part of the method quite valuable, as well as stimulating.

5—Evaluating and Generalizing

In this final phase, the performance was quite uneven, varying with the case and the leader. As in fact-finding, the members felt considerably more at home when the discussion centered around plant personnel administration, as it usually did in the sessions devoted to arbitration cases. In short, when the members knew better what they were talking about, the leader had no difficulty in directing a lively and constructive discussion.

Take, for example, Session 3, where the case concerned

a millwright who was discharged after he refused to perform work that he contended did not fall in his classification. During our group discussion, there were several worthwhile suggestions offered as to how the specific maintenance-job description should be prepared, how the details should be communicated to employees, and how this would help prevent future disputes.

A revealing illustration of the training offered by the incident process is provided by this specific case.

Scene of the incident was the New England plant of a large processor. Here, tension had existed for several years over the problem of maintenance job descriptions and work assignments.

In late February of 1951, the employees returned to work from a twelve-day strike, which was traceable to this problem and the fact that the company already had disciplined several maintenance men for failure to carry out orders. One of these was Millwright S., referred to in the incident. Then two days later, Millwright S. was discharged for insubordination."

Given these facts, our trainees waded through the fact-finding phase with great enthusiasm and fair efficiency. Pertinent contract clauses were quickly uncovered. Well spotlighted were past practices and also the bitter feelings existing between the company and the union.

In spite of apparently worthwhile results, some members, however, commented later that the time spent in fact-finding could have been reduced considerably by better teamwork in following up questions posed by the members.

In agreeing upon an issue, the group came to grips with the problem of whether or not a straight-forward verdict for either the company or the union was called for. They realized that if the matter were decided in accordance with the wording of some of the suggested issues, there would be difficulty in arriving at a middle-ground verdict that would provide for a less severe penalty than discharge. As finally agreed upon, the issue was—

"Did the company act properly in discharging Sampson?"

Within the eight minutes allotted, all members turned in their written decisions. Six decided in favor of the company, holding that discharge was warranted. Two decided in favor of the union, stating that no penalty was proper under these circumstances. One suggested a lesser penalty than discharge.

In the concluding phase of the session devoted to evaluation and generalization, the group explored these interesting questions:

1. Why had the company "bucked" the union on the problem of job descriptions? And how might this matter be resolved to advantage?
2. Why had the union resisted flexibility in the wording of maintenance job descriptions?
3. What were the tensions existing at the time of the incident? And how might they have been lessened?
4. How could new job descriptions be drawn up and communicated to all concerned?
5. What were the merits of each side's arguments,

(*Turn to page 215*)

• • •

TWICE AS MUCH MEAT is placed in storage and freezer areas at Albert F. Goetz, Inc., with wire-mesh containers. And manual handling has been cut 90%.

Bulk-Handling Baskets Save Labor and Space

Wire mesh containers and lift trucks handle 1,200 lb. of meat at a time to improve efficiency in Baltimore plant

HAM HANDLING COSTS have been cut 90% by Albert F. Goetz, Inc., Baltimore meat packer.

The trick is movement of the hams (and other meats) in 1,200-lb. bulk lots. The meat is placed in galvanized wire-mesh containers, and moved to the scales, to storage, and out of storage with manual or power lift trucks.

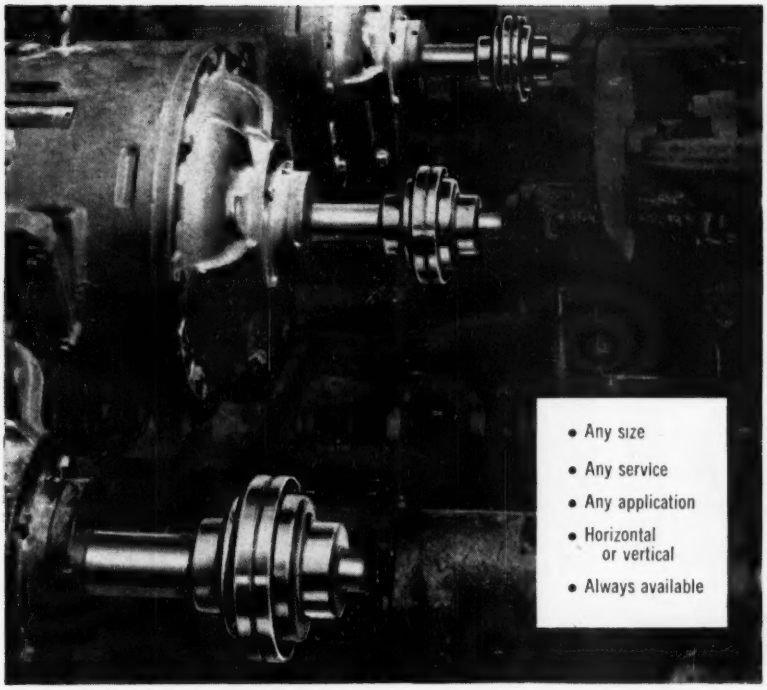
In the cold rooms, the big "baskets" of hams are stacked, three deep to save space. The iron feet of the bottom container rests on a wooden platform, 18 in. off the floor. The feet of the others rest firmly on the top of the one below, notched feet preventing side-slipping.

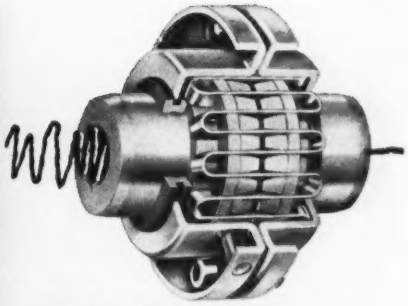
In addition to cutting down on labor and providing more efficient movement of meat in the plant, these baskets save container weight and storage space. They save weight because, in some instances, they have replaced metal tubs weighing 430 lb., as against the 175-lb. bulk of the "basket." They store in less space than tubs because they may be collapsed when empty so that four of them occupy approximately the space of one.

They also have two more advantages over tubs—better circulation of air over the meat and good drainage.

Known as Cargotainers, the wire-mesh units measure 40x48x24 in. and have 2,000-lb. capacity. The type used by Goetz has a special feature in that the usual channel reinforcing the perimeter of the base has been replaced by a rectangular bar for greater cleanliness.

Goetz obtained the containers from Pittsburgh Steel Products Co. and adapted 300 of them to the meat plant's operations after making materials-handling economy studies.





How Torsional Resilience smothers shock and vibration

The steel gridmember connecting hubs fits snugly only at outer edges of tapered hub-teeth. As load increases, gridmember flexes against teeth in proportion to load, providing cushion that spreads peak loads over longer time increment and reduces stresses in machinery.

UNDER NORMAL LOAD

...Accommodates shaft misalignment... Permits free end float

The exclusive FALK all-steel grid-groove design provides compensation for parallel and angular shaft misalignment . . . permits free end float.

ANGULAR MISALIGNMENT

PARALLEL MISALIGNMENT
FREE END FLOAT

FALK Steelflex Couplings save you money by prolonging the work-life of connected machinery

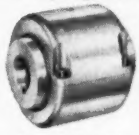
Ever since the first Falk Steelflex Coupling was designed and built, more than thirty years ago, we have firmly held to these beliefs:

1. A coupling, to give fullest value, must do more than merely connect driving and driven machinery—it must protect the machinery and prolong its life.
2. A coupling, to be truly flexible, must overcome the effects of shock and vibration, as well as shaft misalignment (see column at right).

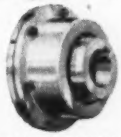
Proof of the soundness of these beliefs is furnished by the record. Many Falk Steelflex Couplings installed 10, 20, even 30 years ago are still giving trouble-free service—still providing maximum protection for the machinery they connect!

A single basic type—the world-famous Type F—fills nine out of ten industrial application needs. Versatile, efficient and economical, it is always quickly available, in a wide range of sizes, regardless of your location. Write to Department 247 for engineering bulletin, including selection and dimension details.

Special or Dual Purpose FALK Steelflex Couplings for problem applications



LIMITED SPACE
Type FS

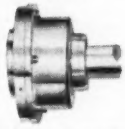


RAPID REVERSING SERVICE—Type CM

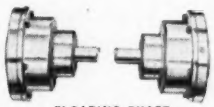
HIGH SPEEDS
Types H and HH

BRAKEWHEEL SERVICE
Type BW

OVERLOAD CONTROL
Type FT



EXTENDED SHAFT
Type P



FLOATING SHAFT
Type PP

Do you have a coupling problem?

If so, describe it in writing—we will gladly recommend the proper Steelflex coupling for your needs. Write to Department 247.

THE FALK CORPORATION, Milwaukee 8, Wisconsin

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impulse® steam traps

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"Immediate delivery from local distributors"

More than 250 Industrial Distributors in the United States and abroad stock and sell Yarways. Write today for the name of the one nearest you.

Cut-away section of Yarway Impulse Steam Trap showing only moving part, a small stainless steel valve.

YARNALL-WARING COMPANY
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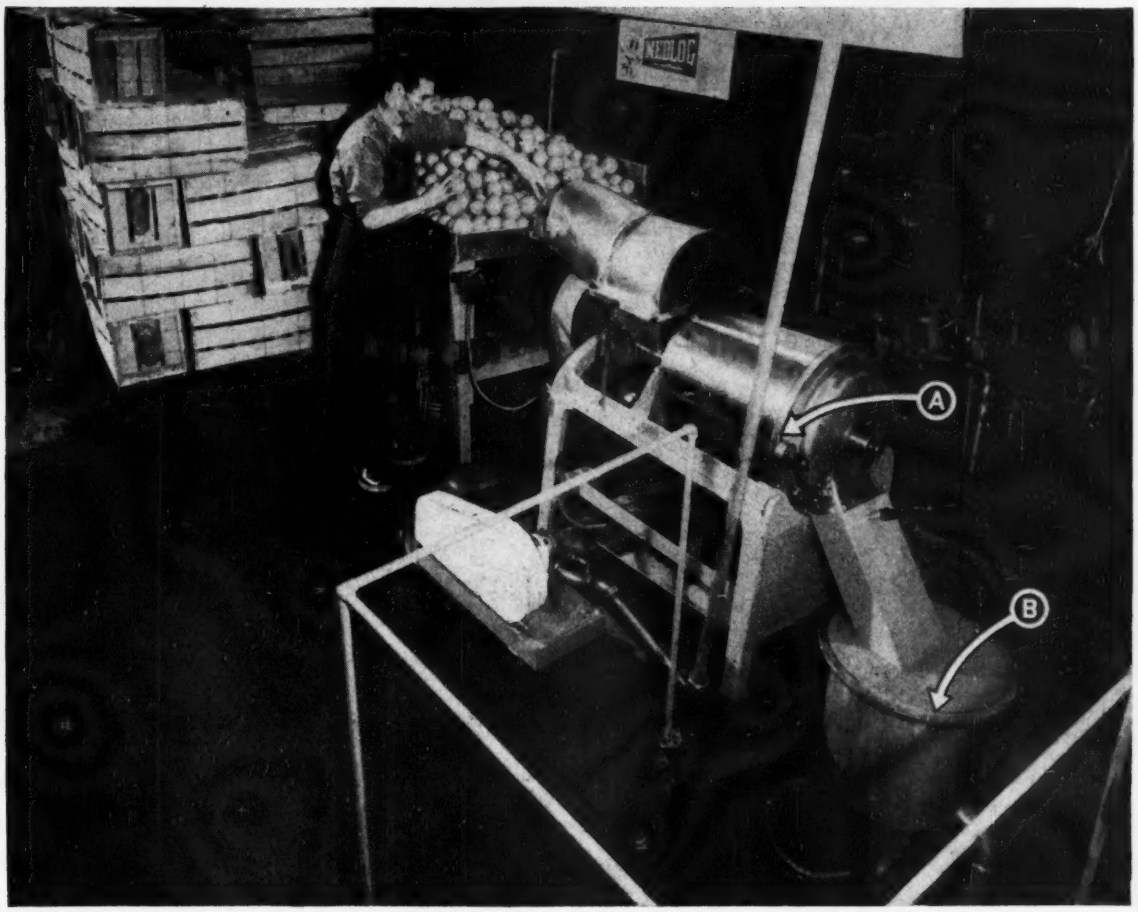
Rinds Go Right Out—Ground and Flushed



AT NEDLOG'S Chicago plant, disposal of citrus rinds is continuous. Fruits are fed into juice extractor (A) and rinds continue to disposal unit (B) that grinds them into particles that are flushed directly into sewer.

Disposes of Wastes *at the Source*

★ Improves sanitation: No odors, insects, rodents, or other pests.

★ Slashes costs: No handling, storing, cleaning, or hauling away

FE STAFF

In a number of food operations, tough problems are posed by those portions of the raw materials that are inedible and so must end up as wastes.

Not only are there fruit and vegetable trimmings, pits and seeds, fish gurry, poultry viscera, and the like, but also contended with are the rots that must be culled from a variety of fruits and vegetables.

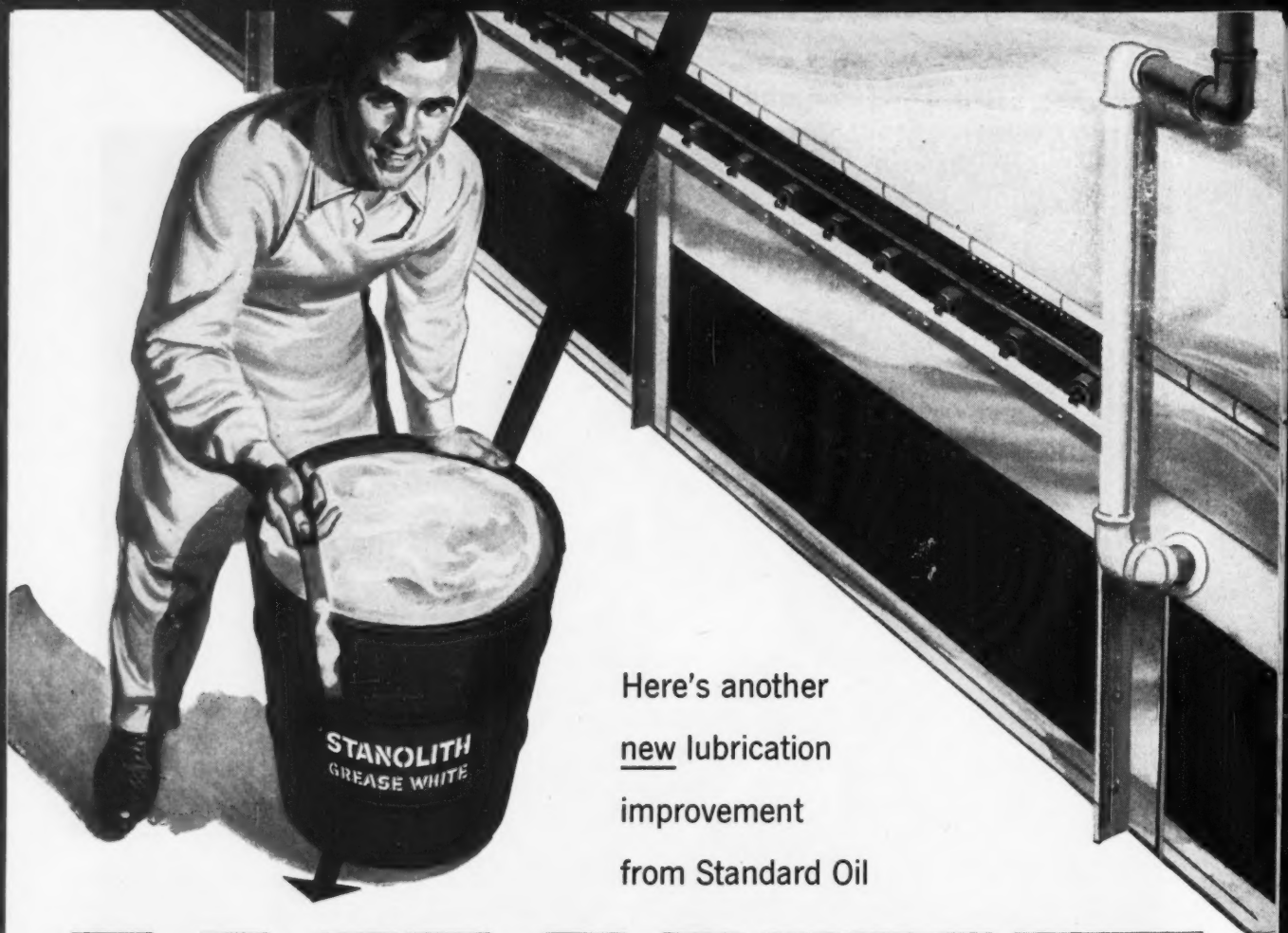
Most of the common disposal methods are headaches, adding to the cost of preparing and packaging foods, as well as causing gripes among workers who must handle the messy materials. What's more, these wastes are decidedly insanitary.

As for costs, there are garbage cans and other containers that must be purchased. Detergents and, sometimes, disinfectants must be employed to clean and sanitize them. There are the production slow-downs and manual labor for hauling waste from process to storage and then to loading dock. Finally, there's the scavenger service.

Now for the question of sanitation: Any food waste quickly becomes offensive-smelling when kept too long in a plant. Regardless of the waste's condition, it's a fly-and rodent breeder. Too, it's a potential source of food contamination.

Not to be overlooked is the costly floor space taken up to store waste for later disposal and to stock detergents and disinfectants.

▶Today, however, a number of food companies are disposing of these various complications as well as the wastes which created them—by employing a special heavy-duty disposal machine. Designed for continuous performance, this unit—made by Herlex Mfg. Co.,



Here's another
new lubrication
improvement
from Standard Oil

WHITE

NEW STANOLITH GREASE

A new grease! White and clean in appearance, STANOLITH Grease White is the perfect grease for use in food and beverage plants.

Specially recommended for bakeries, breweries, candy factories, canning and cereal plants, chemical processing plants, dairies, distilleries, meat processors — all industries where clean, sanitary operating conditions are at a premium.

● STANOLITH Grease White is a new high quality, multi-purpose lithium soap grease with a clean, white color. It assures you of unmatched lubricating cleanliness *plus* unmatched lubricating efficiency.

In addition to the high-temperature and water resistant properties, characteristic of most lithium greases, STANOLITH Grease White has superior mechanical and chemical stability. It provides a water-resistant lubricating film that gives this remarkable grease extended multi-purpose usage in a wide variety of applications. Easily handled in all usual types of grease-dispensing equipment, it is safe, easy-to-use, clean. Call your nearby Standard Oil lubrication specialist for full details on new STANOLITH Grease White.

STANDARD OIL COMPANY *(Indiana)*

STANDARD

Chicago—automatically grinds waste into ⅜-in. particles that may be water-suspended and flushed into a sewer.

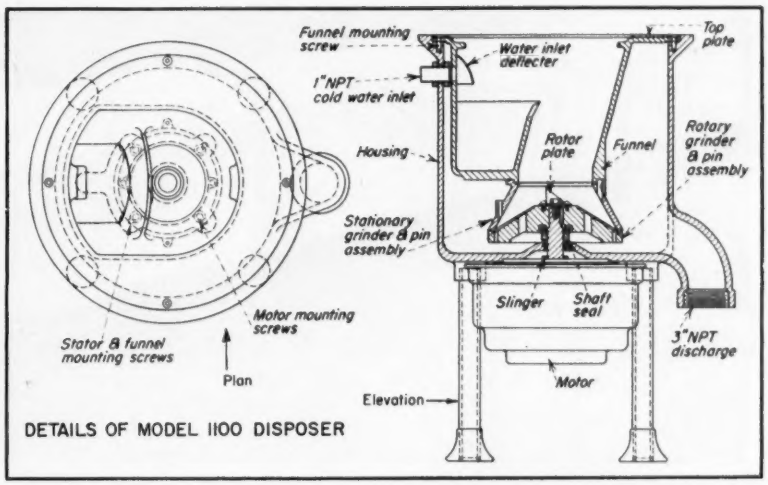
Rated hourly disposing capacity of a 5-hp., 1,750-rpm. unit is about 1,000 lb. of waste. Water requirements run to 8-12 gal. per minute. Installations run in $1,250-$1,500 range, not including motor.

How Different Companies Use It

In Chicago, Potato Service, Inc., really had a problem with its waste. Of the 1,000,000 lb. of spuds daily sorted, graded, packaged, about 10% were rots. And these took up 3,000-5,000 sq. ft. of space while awaiting disposal.

At one time, farmers begged to pick up these rots for hog feed. But this arrangement proved unsatisfactory. The farmers were too irregular in their visits, and as a result, the rots often piled up and smelled-up the plant. And it also got to the point where this packer had to assign men to load the farmers' trucks.

Now the disposal of bad potatoes is no longer a chore, but is carried out smoothly and immediately. Culled from the inspection belt, these potatoes are transferred onto a conveyor that feeds them to a pair of horizontal rollers set 1½ in. apart to flatten out any that are oversized. Potatoes then are charged into the disposal unit, where they are ground and then flushed into the sewer.



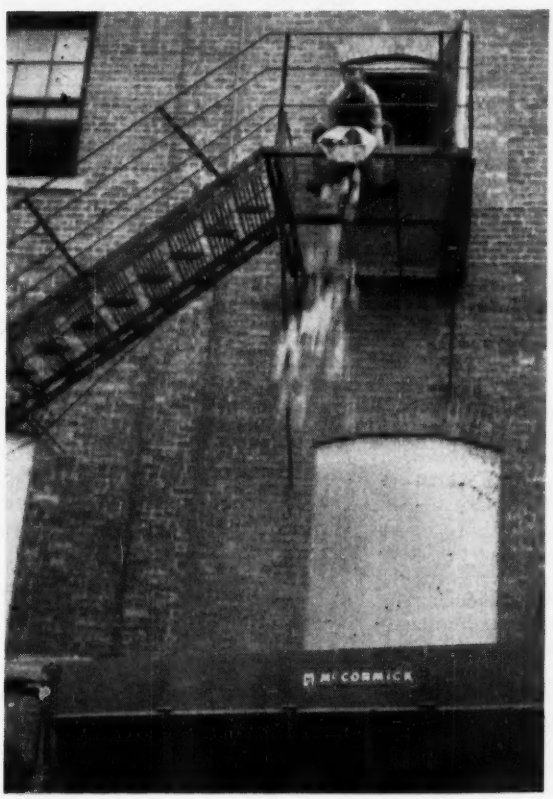
DETAILS OF MODEL 1100 DISPOSER

Another Chicago plant, the Nedlog Co., hooked up a waste-disposal unit to its orange-juice extractor. In so doing, it has eliminated the need of two men who used to hoist-handle as many as 40 vats (300-gal. size) of the plant's orange-peel waste a day.

Still another processor—W. F. Straub & Co.—is source-disposing pits and peelings trimmed from fruits going into the manufacture of jams, jellies, and preserves.

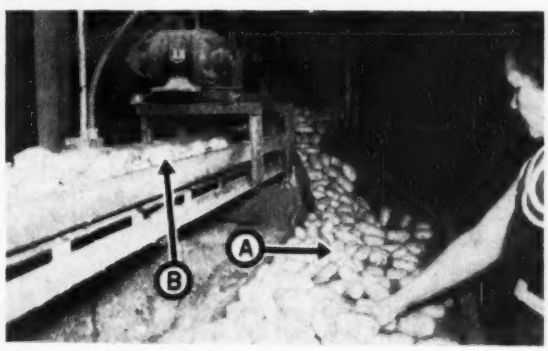
Moreover, a pie bakery is conveying wastes from apple-peeling and coring machines to one of the disposal units. And there are several prepackagers of fresh produce and salad mixes using the machines.

Culls once hauled away . . .

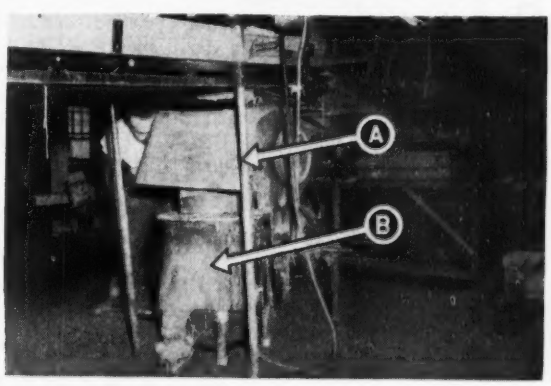


FORMERLY, men had to be taken off productive jobs to dump bad potatoes into hog-feed trucks.

. . . now vanish via sewer



NOW these culls are picked up from sorting belt (A) and put on reverse belt (B) going to disposer.



THEY then are flattened between rolls (inside A) and go into grinder (B) on way to sewer.

"THERMO TRAIN" operating in a producing region—in this case one of Sweden's blueberry areas. Car on left carries refrigerating units. Center car is filled with lug boxes of berries being frozen. After task is finished, it will depart for warehouse and be replaced by third car. An additional car, which already has taken out a load, will then be back to continue the cycle. Completing the train is a bunker-and-tool car (not seen).

Yesterday, geography and economics balked proper utilization of much of Sweden's perishable produce. But today these foods are speedily high-balling from producer to market **thanks to . . .**

WHEN FULL LOAD of berries has been racked in a processing car, a —40 F. air blast is tubed in from refrigerating car. Note return air duct (top). On wall at left are eutectic plates that maintain freeze enroute.

SEEN HERE in refrigerating car is main shaft from diesel leading to evaporator fan (right). Belts drive compressors on either side. Vertical belt turns condenser fan. Plant will freeze 22,000 lb. of product in 24 hr.

Railroad-Riding Freezer Plant

HOW SOLVE this dilemma?—

1—A large, but remote, consuming area offers a most promising potential market for frozen products, but . . .

2—The distant producing areas are so broadly scattered and their seasons so limited that it is out of the question, economically, to build the necessary freezing facilities for each one.

This has been the very exasperating situation in Sweden.

Now, however, enterprising interests in the city of Helsingborg have contrived a solution—a "Thermo Train" that literally rides between the dilemma's horns.

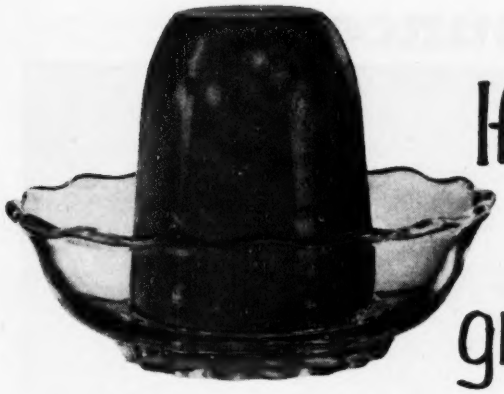
Here's the story: Almost 50% of the food production of this 1,400-mile-long country is found in a 6% area in the south. The north could use plenty of the output, but the fresh produce shipped in the past has tended to deteriorate or even spoil in the course of the distant runs.

Particularly complicating the problem is the aforesaid "loose" geographical disposition of the producing regions and their short (though intense) seasons. Finally, Sweden's population distribution restricts the number of feasible sites for cold storage plants, which must be fairly large to keep charges low.

Required was a means for freezing foods in the separated producing areas while retaining the advantage of low-cost storage in large southern warehouses. And the "Thermo Train" has proved to be the key in the new coordinated processing and distribution system. The train is a fully equipped, rail-riding freezing plant developed by Helsingborgs Fryshus AB, of Helsingborg, Sweden.

Easy Access to Areas

Taking advantage of the country's wide railroad network, this train has easy access to the various growing areas as well as the fishing ports. Thus, freezing operations may be carried out directly on the train at the point of production, with frozen products then efficiently transported to the storage plants. *(Continued on 127)*



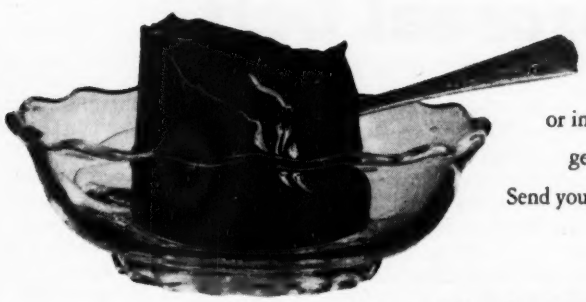
If your Grape Flavor grows pale and wan,

sales are lost,

and customers gone.

NORDA Flavors don't fade out,

So... always come to NORDA



Does the Grape Flavor you use leave a *lasting*, real grape taste? You're in a fix, if flavor fades in a mix, or in any other product you make. Use Norda Flavors, genuine or imitation—because Norda Flavors stay true. Send your business letterhead for generous free samples.

Use a Norda "Favorite to Flavor It"

Norda

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Chicago • Los Angeles • San Francisco • Montreal • Toronto • Havana • London • Paris • Grasse • Mexico City

B. F. Goodrich announces

Even grease and salt can't hurt the new Koroseal belt

HERE'S the new Koroseal belt that is making important savings in food processing plants, bakeries and other places like this potato chip plant, where grease and abrasive salt used to shorten the life of canvas, rubber or plastic-coated belts.

Because it's made of Koroseal flexible material, this new B. F. Goodrich belt is not affected by cooking oils, animal fats, most acids—and it stands hard use, rough handling and just about everything else that ruins most materials.

Unlike belts that are just coated with plastic, Koroseal is used throughout this B. F. Goodrich belt, and so resists cracking and peeling, never gets soft or sticky. Oil can't penetrate Koroseal's tough surface, food particles can't grind in. That's why this belt is so easy to clean. A moment with detergent and water, and the Koroseal belt is as clean and new looking as ever.

Other new belts, developed by B. F. Goodrich for food handling, include a thin white Koroseal belt for use in cooling tunnels, and two belts, called Highseal and Kleenseal, that are made of new types of rubber compounds. Their "sight-saving" green color reduces glare and eye strain on packaging and inspection lines.

Find out more about these longer-lasting, work-saving food handling belts. Have your BFG distributor survey your belting needs and recommend the right B. F. Goodrich belt for your process. If you don't know the distributor nearest you, write us and we'll have him call you. *The B. F. Goodrich Company, Dept. M-330, Akron 18, Ohio.*

Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

Three important advantages are reported gained by the use of the train — high product quality, minimum waste, and facile transportation to reach low-cost storage centers.

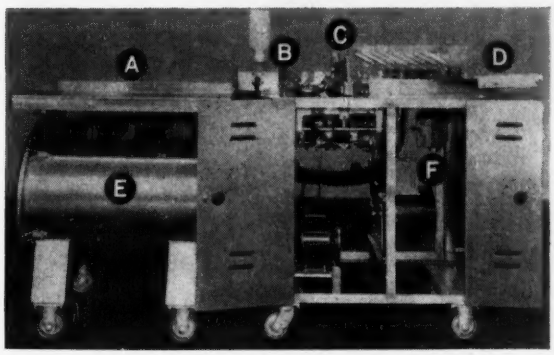
Designed to operate as an air-tunnel freezer, the train employs three transport cars and a fourth car containing a refrigerating plant. Transport cars are equipped with American-made eutectic plates, which keep the temperature of frozen foods below 0 deg. F.

In the refrigerating car is a complete diesel-powered plant with capacity for freezing 22,000 lb. of product in 24 hr. While foods are being frozen in the transport car, the latter's

(Turn to page 176)

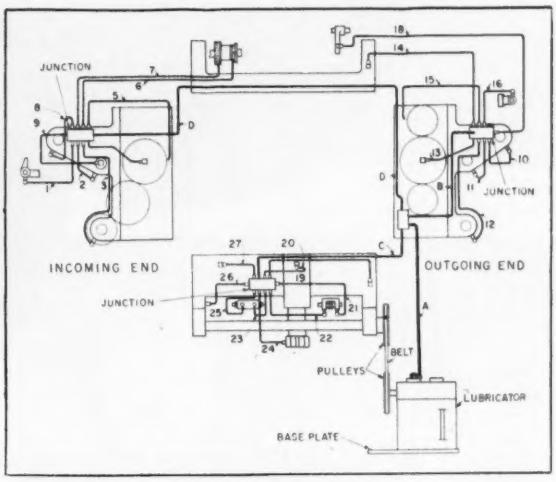
● ● ●

This machine, with 26 wear points . . .



PEELER for skinless frankfurters takes string of franks from platform (A) and passes them through steam bath (B) to expand skins. Knives (C) separate frankfurters and cut casings for suction removal. Peeled franks are discharged via conveyor (D). Removed skins are sucked into cylinder (E). Central lube unit is at (F).

. . . is lubricated with this system



LUBRICATOR schematics. Line (A) leads to main junction; (B), (C), and (D) to secondary junctions. Numbered lines carry lubricant to 26 machine wear points. Metering orifices proportion filtered oil to lube points.

26 Points on Machine Oiled Automatically

Pace-setting application shows way to cut maintenance time and wear for food machines with many parts

TO SAVE maintenance man-hours and machine wear, meat packer S. Haydu & Sons, Inc., Newark, N. J., has installed an automatically lubricated frankfurter skinning machine. And there you have a pace-setting example of what can be done with mechanized lubing to facilitate the operation of food plant machines with many small moving parts.

The frankfurter skinner involved in this example has 26 points that are automatically lubricated, including internal gears, bearings, and clutches. And without the lube system, these points would require manual greasing at least once a day, because the machines have to be washed down at the close of each working period, and the lubricants have to be replenished.

Hand oiling would take at least 10 or 15 min. per day per machine, and could easily run into overtime. Furthermore, it is easy to skip lubrication points and difficult to apply lubricant in the same amount each day.

But the oiling system automatically distributes the correct amount of lubricant to the various points at periodic intervals as long as the machine is in operation. The system, designed by Bijur Lubricating Corp., is applied to a Ty Peeling Machine designed for automatic lubrication by Linker Machine Co.

The lubricator is a combination reservoir, filter, and cam-actuated pump. The pump discharges 5.5 cc. to a distribution system every 38 min. at a pressure of 40 psi. Capacity of the reservoir is 1 pint, or 473 cc., which is sufficient for about 55 hr. of operation.

Oil flows from the lubricator to a main junction, which in turn distributes it to three other junctions for delivery to the points of lubrication. By the use of these junctions, duplication of lines is avoided. Flexible hose is used where relative motion between machine parts causes constant flexing of the tubing.

Meters Oil to Various Points

Meter units actually proportion the flow of oil to the various lubrication points. All of these units are located at the junctions, with the exception of the three for the main shaft bearings and clutch.

The meter unit consists of: (1) a felt filter which acts as a safeguard against foreign matter getting to the point of lubrication, (2) a metering orifice in which the clearance between the pin and hole regulates the amount of oil fed to the lubrication point, and (3) a check valve, kept closed by spring action except when the pump is in operation. The check valves, including one at the pump, keep the distribution lines full of oil.

Meter units of three different flow rates are used on the frankfurter peeler. The amount of lubricant delivered to a given point depends, of course, on the service conditions under which the particular part of the machine is operating. Thirteen of the bearing surfaces receive 0.17 cc. each per pump cycle; eight receive 0.34; and five receive 0.10 cc.

"STOP-AND-GO" SEPARATION .....HAS NO PLACE IN MODERN PROCESSING

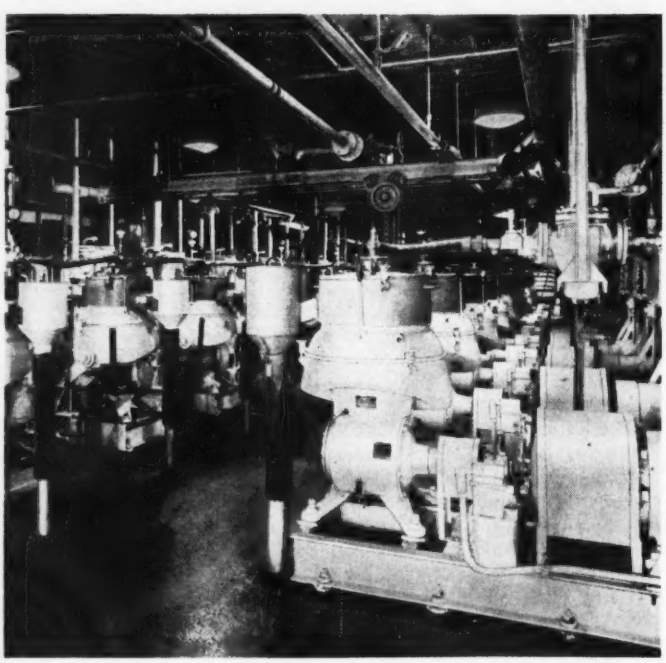
One of the foundation stones of American manufacturing supremacy is continuous, streamlined production, with raw materials moving at a steady, uninterrupted pace from start to finish.

There is no place in this picture for anything that introduces "stop-and-go" into the production line.

That is precisely the reason why so many chemical, pharmaceutical and food manufacturers are now using De Laval Centrifugals instead of filters and settling tanks.

De Laval Centrifugals make separation, clarification and concentration *continuous* processes. They can do in *seconds* what would otherwise take *minutes* or even *hours. They save time! They save money!*

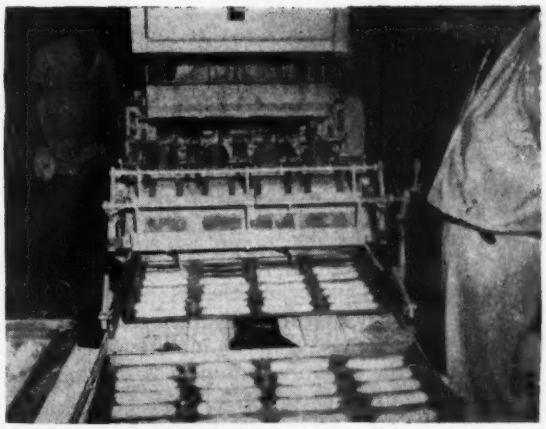
De Laval Engineers will be glad to show you, entirely without obligation, how De Laval Separators and Clarifiers can speed up production in *your* plant.



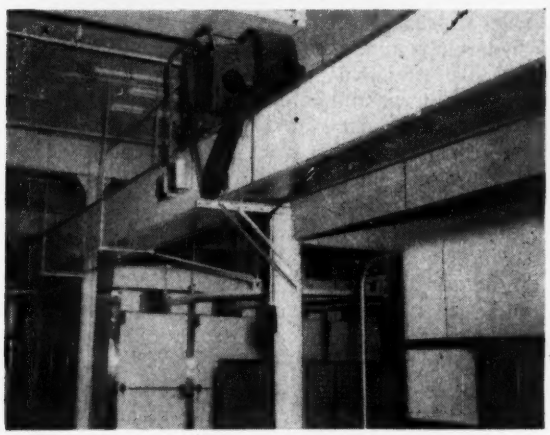
THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York ● 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5

DE LAVAL
FOR FASTER PROCESSING SYSTEMS

1 DOUGH chutes from mixer into hopper feeding vac-type divider. It next goes to rounder, proofer.



2 FULLY AUTOMATIC molder forming and panning frank rolls. It's readily switched to make 'burger buns.



3 OVERHEAD COOLER. It brings buns to room temperature as they move to slicing-wrapping units.

4 HIGH-SPEED MACHINE slices traveling buns ('burger type here) enroute to the wrapping unit.

1,000 Dozen Rolls an Hour

—is the striking output from Zinsmaster's flexible frank-and-hamburger bun line . . . Sparking the mechanization are an automatic dough divider, molder-panner, specially built traveling overhead cooler, and slicer

FE STAFF

Accelerated pace at which the public is continuing to gobble up hamburgers and "red hots" has put the bakers on the spot.

The big problem is to get a balanced production of the buns into which these meats are sandwiched.

► But no longer on the spot is Zinsmaster Baking Co., St. Paul, Minn. At this bakery, hourly output has been zipped to a lofty 1,000-doz./hr. rate on a single line that can be switched from frankfurter to hamburger buns.

Pace setters in this high-speed setup are the new automatic Union panner hooked up to the fully continuous dough divider; company-built, continuous, enclosed, blower-type, belt cooler; and mechanical, adjustable bun slicer.

Now, let's see how this 1,000-doz. bun line operates.

Dough first is prepared in a 1,200-lb.-capacity mixer on the 2nd floor, then is chuted into a hopper (175-lb. capacity) feeding a 12-pocket divider on the floor below. Portion of the rotary divider over which hopper is mounted is enclosed, so that a vacuum (20 in.) pulls 1½ oz. of dough into the pockets. A stationary knife then cuts dough as it is forced up and out of piston-operated divider pockets.

Edible oil, dropping from a 1-qt. container, lubricates divider to prevent sticking of dough and curb production down-time.

From divider, scaled dough pieces continue to the rounder and 4-pocket, overhead proofer. After 1½ min. of proofing, dough balls drop, four at a

(*Turn to page* 178)

In Behalf of Progress . . .

Don't Be Complacent About DDT in the Diet

Chemical contamination of food has made the newspapers again. In the October 16 *New York Times*, readers picked up the information that the average American eats 184 micrograms of DDT daily. This, be assured, is an infinitesimal amount—far below the quantity consumed by human volunteers without injury.

The amount of DDT in the diet was reported at the annual meeting of the American Public Health Association by Dr. Wayland J. Hayes, Jr., chief of the toxicology section of the Communicable Disease Center of the Federal Public Health Service. Dr. Hayes based his information on an investigation of meals served by restaurants and institutions.

The presence of DDT on breakfast, lunch, and dinner tables is attributed to grains, meats, and other foods from farms where the insecticide is used. Fatty foods are said to contain more than other foods. The "miracle" insecticide of World War II is absorbed by plants and animals, and is not removed by processing.

This is an interesting bit of news, for as Dr. Hayes points out, there has been a strange lack of information as to how much DDT might be expected in the total diet. It also is significant for other reasons.

For one thing, it points up the fact that food processors haven't had enough information about insecticide residues to guide them in their quality control work. And they were not helped any by the four-year delay on the part of the government in establishing additional pesticide tolerances for fruits and vegetables.

Another point of significance is something for the future. It reminds the industry of the desirability of avoiding insecticide residues in all foods.

A well-known baby-food packer came up with one answer a couple of years back. This firm refused to buy contaminated raw materials from farmers.

But insecticides are essential to satisfactory farm production. Anyone with a green thumb knows that.

Yet we should not accept indefinitely a situation which results in contamination of foods with foreign materials. And that applies even where safe tolerances are known and enforced.

Consumers don't care for such contamination, even when assured that it is entirely harmless. They suspect subtle allergy-like effects, which they know are difficult to detect.

We can be so bold as to believe that new types of insecticides and methods of application eventually can be developed to avoid residues. Certainly there can be few more important projects on the research programs of insecticide manufacturers and federal and state agricultural laboratories.

While awaiting "utopia" in insect control, food manufacturers should be carefully watching residue levels in finished products, and themselves researching for methods of removing residues.

There is no cause for alarm in the current situation. Neither is there any reason for complacency.

Put Those Versatile Radioisotopes To Work

Some surprising things are being done with radioisotopes in the food industry.

Take their use at the brewery of John Labatt, Ltd., Canada, as described at the recent conference on Atomic Energy in Industry.

Use of a ¼-curie source to detect thin spots in the steam-jackets of copper brew kettles worked so well that it has been adopted as the standard method.

Equally successful has been the employment of a portable radioactive detector to precisely determine when closed beer tanks are full. Cost of putting a sight gage on each tank is saved, and the leak-hazard and sanitation shortcomings of conventional gages are avoided.

Most unique was the pumping of a 2-curie radioactive washing soda solution through the pipes of a space-heating coil imbedded in a concrete floor. The purpose was to locate a leak. It worked beautifully.

Labatt also experimentally pasteurized beer with 60 curies of cobalt 60. That worked, too—except that the effect on proteins in the brew changed the color and taste. Now Labatt is watching with interest the results of other research in the control of such side-reactions.

Procter & Gamble has measured the amount of a toxic food substance remaining in the bodies of rats with the aid of radioisotopes. The purpose was to determine the cumulative effect of a diet containing the substance.

P&G and Wyandotte Chemicals Corp. both have studied the efficiency of detergents with radioisotopes. Other firms have used them to investigate dispersion in mixtures, wear of metal, performance of lubricants, and chemical composition.

Radioisotopes are no miracle answer to all tough analytical, control, and measuring problems in industry. But they are a tool whose versatility should be considered by all technical people in the food field.

These materials are readily obtainable from the Atomic Energy Commission. You must know how to handle them safely, but you don't have to divulge your secrets to get them.

GAIR can help PROMOTE YOUR PRODUCT with eye-appeal PRINTING

Attractively printed Gair shipping boxes double as sales promotion aids—giving prominent display to brand names while traveling through the channels of distribution. Prospects along the way—from factory to warehouse, to store, to home—see these sales messages.

Look around. You'll notice that products from paints to peanuts, from soaps to stoves carry colorful, well-printed identification on their shipping boxes.

What about yours?

Remember, this traveling display is economical. You own the "billboards". . . for just the cost of plates and printing you add a strong link to your promotional chain.

To learn how your shipping box can double as a sales promotion aid, check with the Gair plant nearest you. Learn, too, how Gair's assured supply source, engineering ability and delivery service help give you the best in corrugated or solid fibre shipping boxes.

Ask for our booklet on the sealing of boxes.

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NO. TONAWANDA, N. Y. • PHILADELPHIA, PA. • PORTLAND, CONN. • RICHMOND, VA. • SYRACUSE, N. Y. • TETERBORO, N. J.

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For more information, use coupon on last page.

The Reader AUDITED PAID CIRCULATION ABC *His Mark*

THE ABC SYMBOL, which appears at the head of this page, is your brand—the reader's brand—on this magazine. It stands for Audit Bureau of Circulations. It means that this magazine will stay in business only so long as it continues to serve its readers to their satisfaction.

That Bureau—known for short as ABC—is a voluntary, nonprofit, cooperative association founded in 1914 by a group of publishers, advertisers and advertising agencies who wanted to establish and maintain higher standards of publishing practices than then prevailed. Its primary and specific purpose was to set up yardsticks to appraise circulation values and to verify the claims of publishers as to their circulations. For the buyer of advertising space this provides an effective means to take some of the guesswork out of buying and to reconcile the conflicting claims of competing publishers. BUSINESS WEEK magazine has aptly described ABC as "the publisher's conscience—and cop."

BUT IN DOING that job, ABC performs another function of high importance to the readers of ABC member publications. It provides a constant pressure on the publishers to keep alive in their staffs a sense of primary responsibility to their readers. That is because the most simple and direct method of making a publication responsible to its readers is to place upon it a purchase price, whether by subscription or newsstand purchase. The right to purchase or to refrain from purchasing a publication gives to the reader and to no one else the power to pass effective judgment on the publisher's success in serving the reading public. Each paid publication will grow or languish, will prosper or fail, in proportion as it wins or loses the following of thousands or millions of readers. The readers, by their patronage, record their judgments as to whether the publisher and his publication are measuring up to their responsibility to them.

And that is where the ABC comes into the reader's picture. The newspaper or magazine that carries the ABC symbol on its masthead must in the first place be a paid circulation publication. Moreover, it must conform to the high standards set up by the Bureau as to terms of payment and accounting methods. And again it must open all of its books to the auditors of the Bureau on demand.

SINCE THE INFORMATION thus determined by thorough and impartial audit is periodically made public through the ABC statements and audit reports, it is constantly available to and universally used by advertisers who are considering the purchase of space in an ABC publication. These reports show the circulation trend, as verified and certified by ABC, and thus put the advertisers in a position to know whether or not the publisher is rendering satisfactory service to his readers.

Thus the publisher who submits his publication to the supervision and discipline of ABC affirms in the strongest possible manner that he recognizes his primary obligation is to his readers and that he owes his standing to a voluntary demand by those readers. It follows that the editors of ABC publications must be exceptionally alert to the desires of their readers and responsive to their needs, since any decline in circulation will soon show up in the ABC statements and audit reports.

THAT IS WHY we describe the ABC symbol as the reader's brand. It shows that a publication must be primarily responsive to him and that he holds in his own hands its success or failure. And that ABC symbol is not only a constant reminder to him of that fact, but also an equally constant reminder to all concerned that the reader's willingness to pay for the ABC publication is the acid test of its value to him and to the advertiser.

McGraw-Hill Publishing Company, Inc.

Celite Filtration assures perfect clarity—

adds eye appeal and buy appeal to food products

TO GIVE foods and beverages that extra quality which results in more sales appeal, leading processors depend on Celite* Filtration.

The Celite method is *efficient.* It removes even the finest suspended solids. Moreover, Celite Filtration is *economical.* It may be used with any type of conventional filter, it is almost automatic, and skilled labor is not required for routine operation. And Celite Filtration is *flexible.* To meet your specific requirements, Celite comes in nine standard grades of microscopically controlled particle size. The right balance between degree of clarity and rate of flow may be easily controlled.

To purify water in large volume—to achieve brilliant clarity in many food products such as sugar, syrups, wine, beer, vegetable oils, cooking fats—to remove many colloidal impurities which may affect product quality . . . Celite Filtration offers unexcelled results.

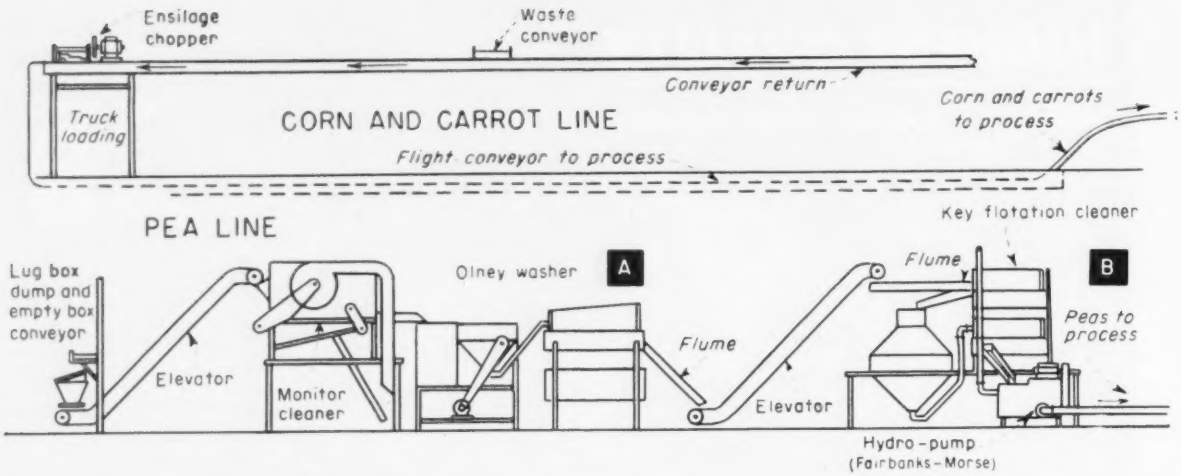
A Johns-Manville Celite Filtration Engineer will gladly discuss the advantages and use of Celite in your product or production process. For his services, without obligation, write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

JOHNS-MANVILLE PRODUCTS

Johns-Manville CELITE FILTER AND PRESSING AIDS

TURN PAGE FOR FOLDOUT FLOWSHEET →



Topflight Freezing-Line Engineering

Multi-Product Technique That Pays Dividends for Northwest Processor

ONE OF THE ORIGINAL food freezers in the Northwest, Pictsweet Foods, Inc., pioneered the use of belt-type freezing and went on to refine and improve the system.

Furthermore, this company, which processes a full line of frozen products, has decentralized its production by locating seven plants in strategic areas where the necessary diversity of raw materials is afforded.

Seen here is the setup at the Mount Vernon, Wash., plant, specifically illustrating the emphasis on engineering for most efficient, economical handling. Salient points are shown by letter-keyed photos, and operations are traced by the numbers 1 through 16.

Processed here are peas, cut and cob corn, carrots, cut and spear broccoli, mixed vegetables, and succotash. There are two semi-mechanized receiving stations, one for the peas, the other for corn and carrots. Broccoli comes in by crate to go directly to processing.

Peas move through cleaning and washing operations, then are hydro-conveyed to the second floor. Here they are blanched, washed, cooled in flume water and then, after dewatering, are quality-graded. Following inspection the product is frozen.

The three major process lines (peas, corn, and carrots) converge at the holding tanks—point (1)—and then follow a single line to the belt-type freezer. Corn and carrots are dumped on the same receiving apron, then "nudged" by tractor's blade onto a conveyor. All corn moves through huskers and subsequently is washed, pre-blanched, and conveyed to a belt (2) where the cob corn is "graded out" from that to be processed as cut corn.

For the story behind this multi-product line, see page 94.

Cob corn is diverted, by cross-conveyor, to saws which automatically cut it into uniform lengths. Next, it is steam-blanched, cooled, and loaded on aluminum trays (3), which are placed in mobile racks and wheeled to the freezer.

The other corn continues along the same line to cutters (4), then is steam blanched, cooled, and separated from undesirable material by a cob reel and a flotation cleaner. Product is then pumped (5) to the holding tanks (1).

Carrots follow the corn line to the trimming belt (2) where they are diverted by a cross-conveyor to two dicers. Diced product passes through a sliver-reel and thence to the steam blancher-cooler. They by-pass (6) further cleaning unit operations and are pumped (5) directly to the holding tanks (1).

The three products that converge at this point (1) move across inspection belts, then are flumed to vibrator dewaterers. As products are elevated to the freezer belt-spreaders, additional moisture is removed by an air-blast.

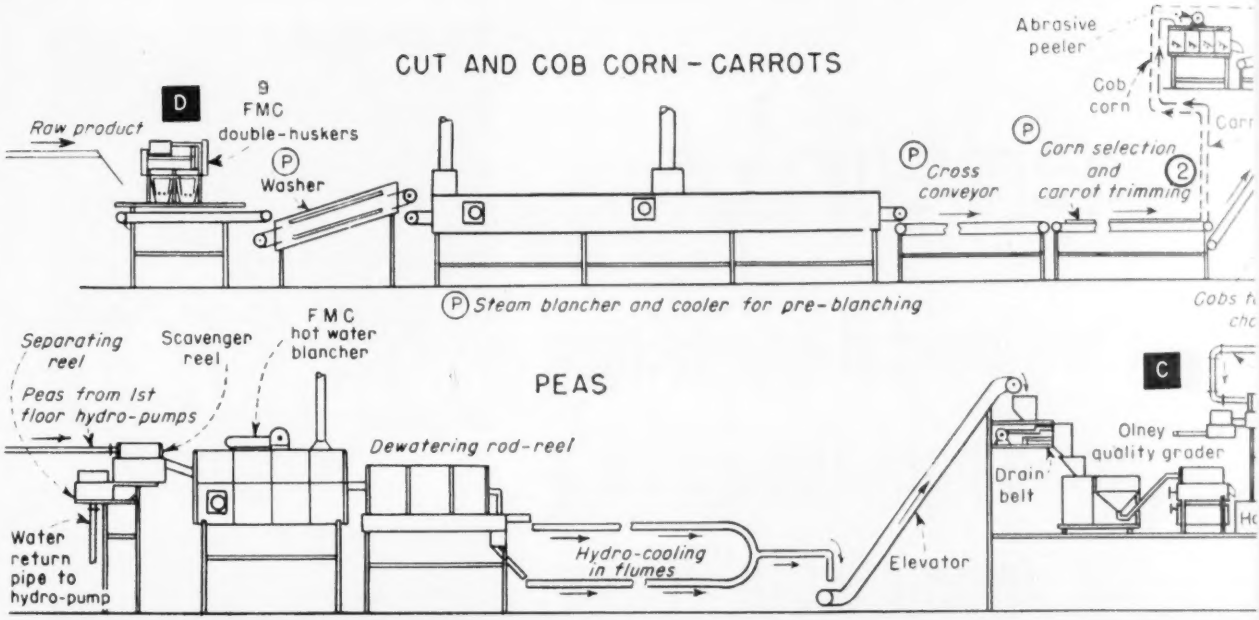
Preparation of spear and cut broccoli is largely a hand operation. But the continuous flow of raw material for trimming operators upon recirculation type belts has brought greater efficiencies and economies to this line. After trimming, spear broccoli is automatically cut to uniform lengths, blanched, cooled, and conveyed to the hand-pack packaging lines. A recirculating type belt provides raw material for the cut-broccoli hand-trimmers. It is then automatically sliced, blanched, cooled, and automatically filled into cartons.

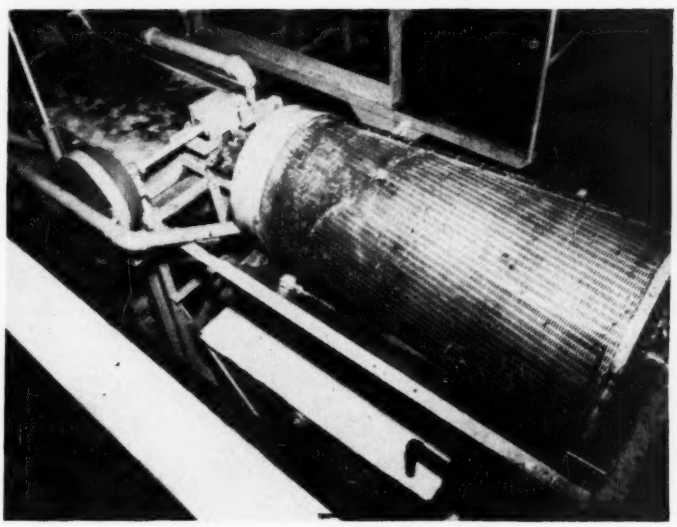
Refrigeration of Belt Freezing Systems

The cycle of refrigeration starts at the king valve, where liquid ammonia (165 psi. at 90.7 F.) leaves the receiver. Part of this liquid goes directly to four pre-cooler units (7), where it is admitted, as required, by a float valve. Rate of evaporation is governed by heat load, and temperature of evaporation by back pressure regulators.

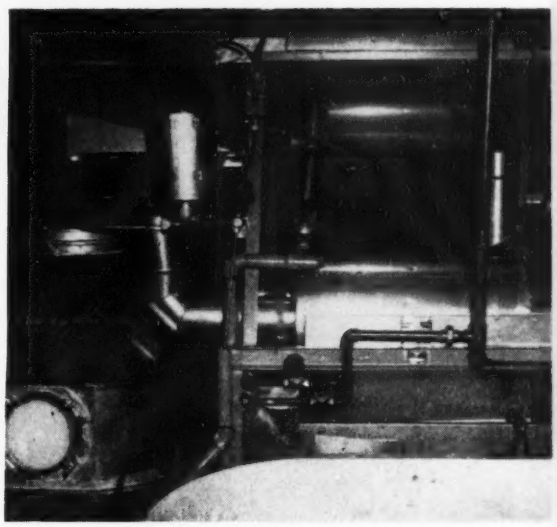
After evaporation, gas passes through a surge drum and returns to the V/W compressor (8)—extreme lower right in drawing. After compression it is returned to the condenser (9), then flows back to the receiver (10).

Liquid ammonia from the receiver also flows to the direct-expansion liquid inter-cooler (11). Here, part of it flashes to gas and, while evaporating, cools the remainder. It also cools the high pressure ammonia, which is circulated through a coil located inside the inter-cooler, and likewise the discharge gas from the boosters (12). The latter is made to bubble through the ammonia.





A **PEAS** discharge from dry cleaner (left) into Olney washer, then are dewatered in reel (foreground).



B **FROTH** flotation cleaners separate extraneous mater removed in previcus cleaning-washing steps.

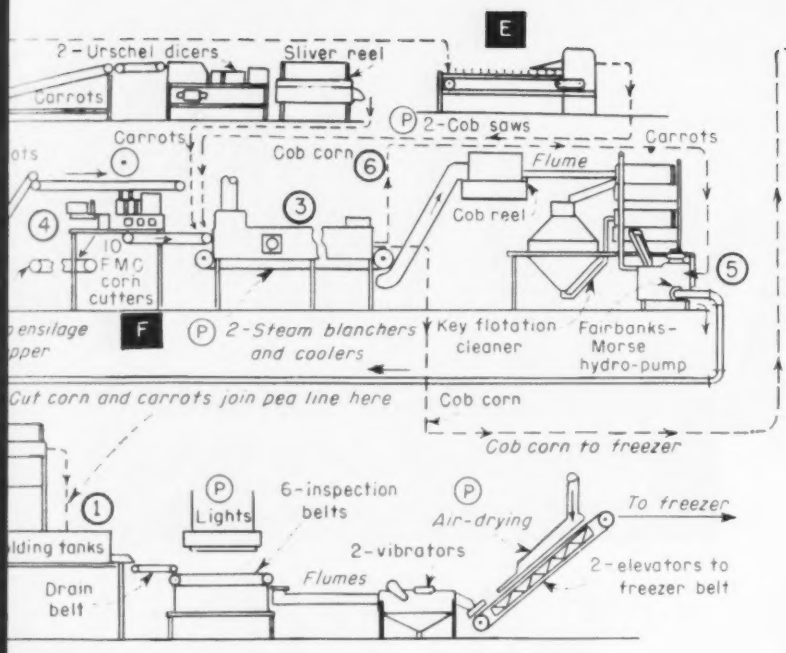
When the ammonia is required at the low pressure receiver (13), a float valve admits it. This receiver is at 6.8 in. Hg vacuum, and part of the liquid flashes into gas, producing −37 deg. F. ammonia. Four 35-gpm. pumps (14) draw ammonia from the receiver and circulate it through the finned coil evaporators (15) in the main freezing tunnels at approximately six times normal evaporation rate. This high velocity cuts down insulating film in the coils and increases heat transfer capacity.

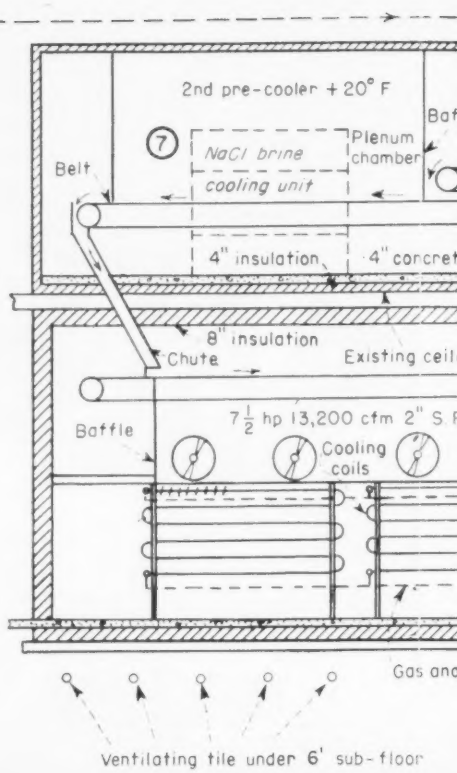
Ammonia-Cycle Details

Gas formed in the low pressure receiver is picked up by the rotary boosters. It is compressed from 6.8 in. vacuum to 22 psi., then goes to the inter-cooler. The secondary compressors (16) draw off the ammonia gas from the inter-cooler and compress it to condensing pressure at 165 psi.

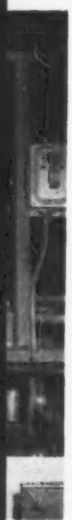
After it condenses, the gas passes on to the receiver, where it is ready to repeat its cycle.

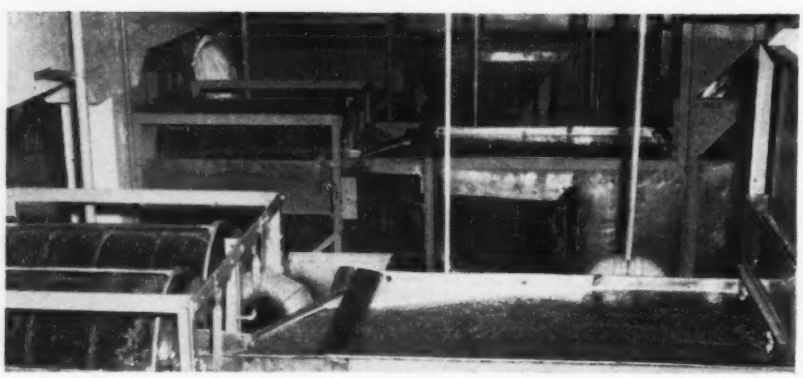
E **TRIMMER** cuts ears to 5⅛-in. lengths for packaging in 5¼-in. cartons and freezing as corn-on-the-cob.

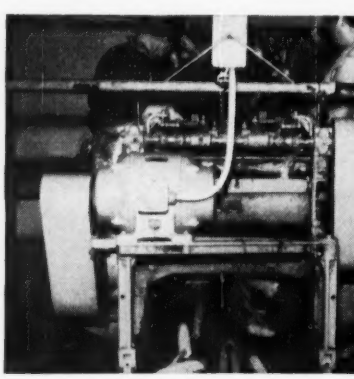




P Designed-constructed by Pictsweet Foods, Inc.





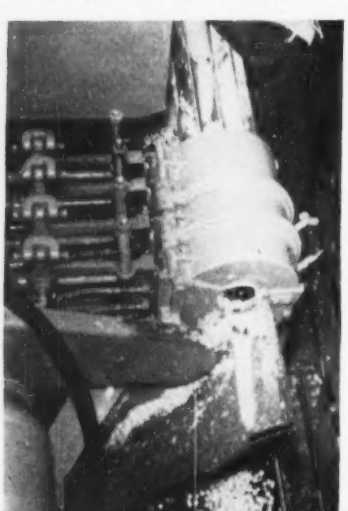


ials not

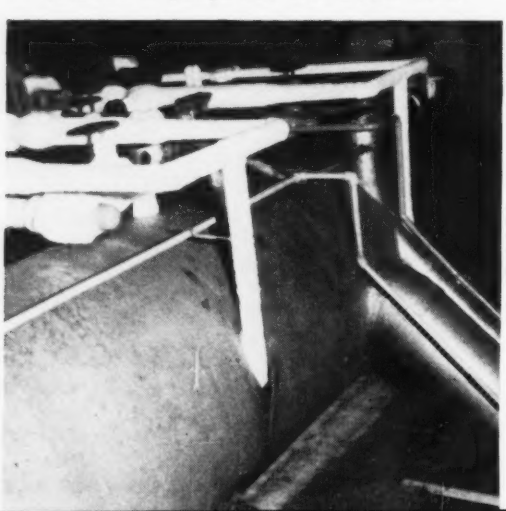
C **QUALITY GRADERS** separate fancy peas from standard grades by means of salt brine of carefully regulated density.

D **HUSKERS** receive corn from c ears to conveyor that feeds wa

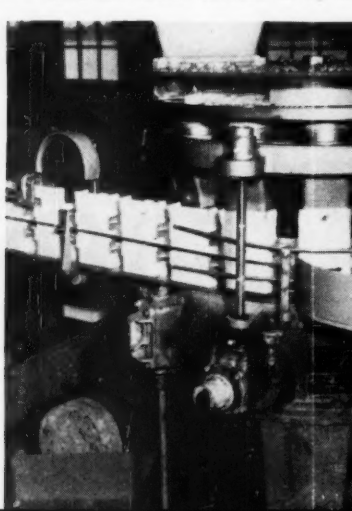
F **CUTTERS** remove corn from cobs, then it is blanched.

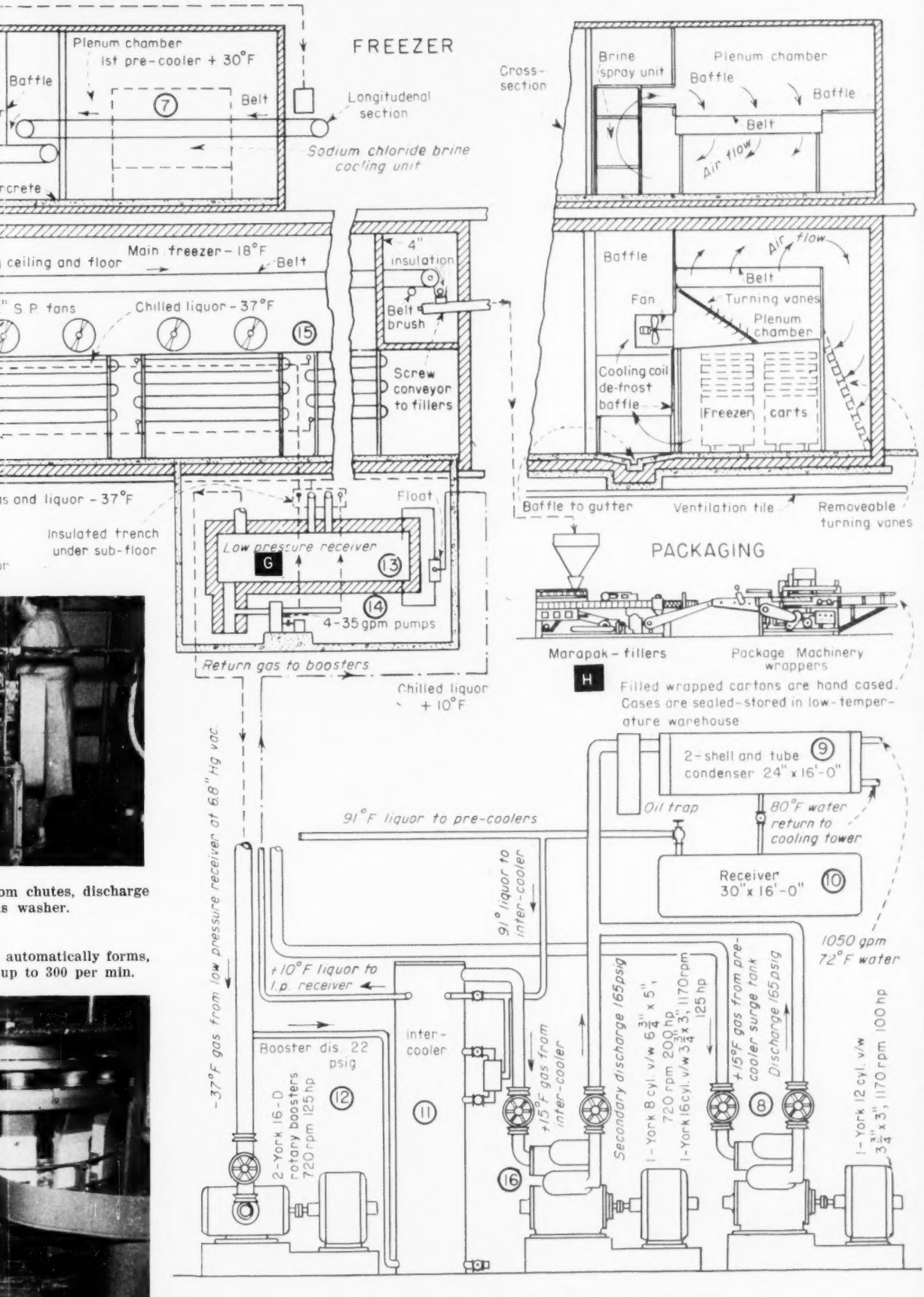


G **LOW PRESSURE RECEIVER** supplies liquid ammonia to pumps that feed freezer coils.



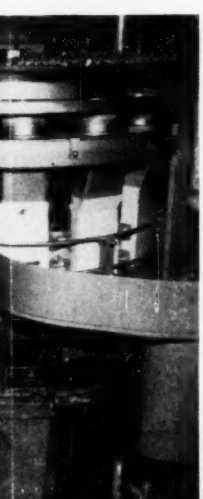
H **FILLER** for retail packages auto fills, and closes cartons at up to





om chutes, discharge
s washer.

automatically forms,
up to 300 per min.

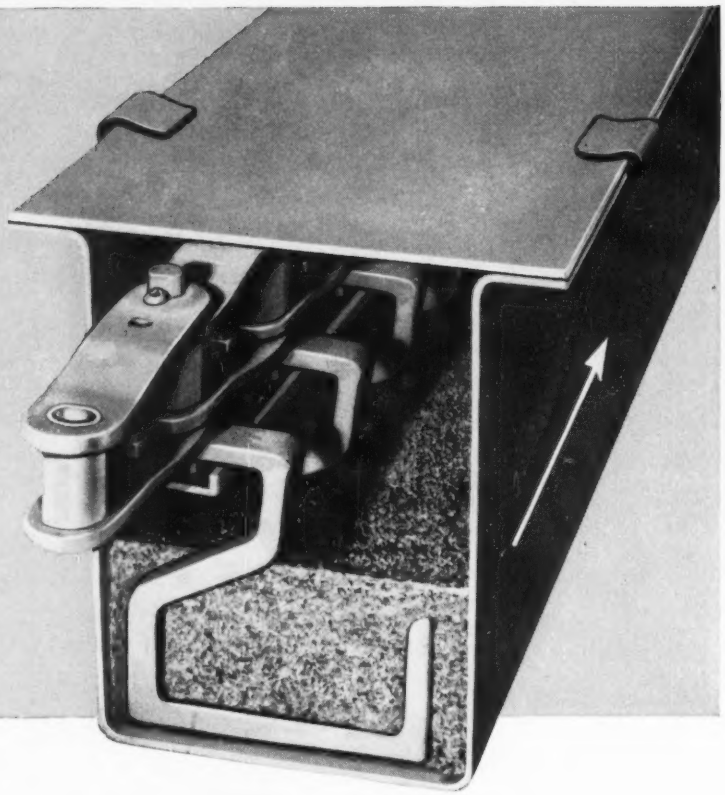


FE PICTURE FLOWSHEET NO. 71

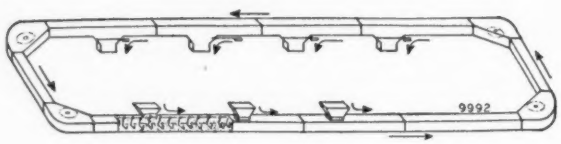
CONVEYS ANYTHING

Economically from COAL to CORNSTARCH

with simultaneous pick-up or discharge at one or many points . . . without dust or contamination . . . in small space



This is an S-A REDLER Horizontal Closed Circuit Conveyor — and a very remarkable unit it is!



It conveys in four directions — can pick up and discharge at many points on its run simultaneously or selectively—does the work of several conveyors of other types. It is fully enclosed — dust-tight and contamination-proof. Because it moves materials *in mass*, in a solid column, it minimizes dust formation and degradation and practically eliminates explosion hazards.

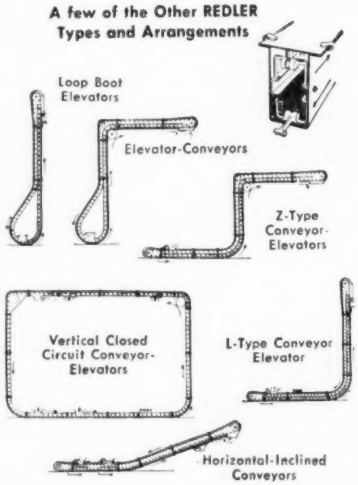
It is self-feeding and can be choke fed without jamming. Any excess material simply recirculates until needed. The REDLER is also self-cleaning, an important advantage when the operation calls for running various materials in sequence. It makes an ideal blending conveyor.

Unusually compact, REDLERS require a minimum of structural support. They can be easily and economically adapted to practically any plant layout.

The closed circuit REDLER is just one of many types furnished by S-A. If you handle or work with any kind of granular, pulverized, flaky or small lump material, a REDLER can help you do it better, cleaner and at lower cost.

Write for Catalog No. 140. We'll be glad to give you a preliminary cost estimate. No obligation, of course.

A few of the Other REDLER Types and Arrangements



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A complete line of industrial ball bearing units available in both standard and special housings.

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for ammonia and other hard-to-handle fluids

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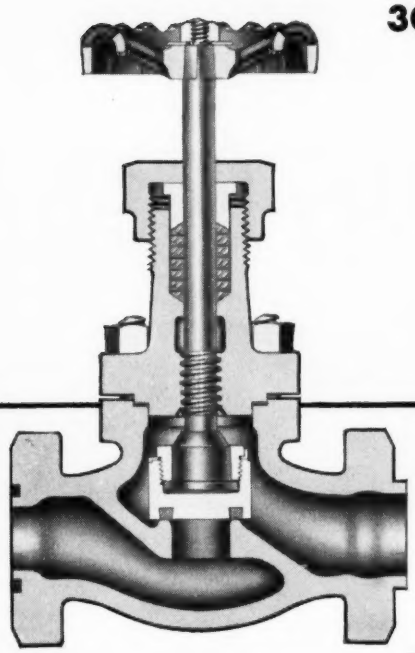
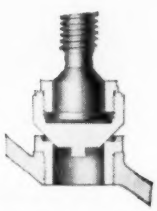
300-pound heavy-duty all-iron valves

Put these Crane valves to the test—use them for ammonia, air, oil, gas, caustic solutions, chlorinated compounds, alcohols —for chemicals and process work. Their rugged bodies of Ferrosteel (35% stronger than cast iron) . . . their precision seating designs . . . the unusually deep stuffing box and high-grade packing . . . the sweeping interior body contours . . . assure the safety and lasting service you want.

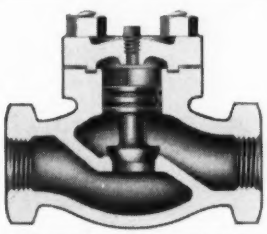
The line includes *bolted bonnet* globes and angles with choice of disc, *union bonnet* globes and angles with plug-type disc, lift checks, expansion valves, relief valves, liquid gauges —and all the fittings, flanges, return bends and other specialties for a complete Crane Quality installation. Check with your Crane man.



Cross-section bolted bonnet Globe, with flanged ends and special lead-faced disc. Sizes ¼ to 4-inch.



Bolted bonnet Globes also available with steel disc and seat where high temperatures or corrosion prohibit use of lead.



Cross-section, Lift Check with bolted cap, and cushioned disc action which increases valve life. Sizes ½ to 2-inch.

New 6-page folder AD1977 catalogs this complete Crane line. Write direct, or ask your Crane Representative.

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Next Steps in Atomic Progress... A Challenge to American Industry

The purpose of this editorial is to throw light on the significance for American industry of recent changes in the statutes that control the development of atomic energy.

The need for clear light on the meaning of this new legislation is made more urgent by the political confusion and distortion that marked its course through Congress. The politically inspired charges of "giveaway" that delayed its passage—charges that were almost totally unrelated to the legislation itself—helped to obscure the vital importance of the step finally taken by Congress.

In sober, post-Congressional fact, the principal significance of the new atomic legislation is that it extends to private enterprise responsibility for the development of peaceful uses of atomic energy, whereas heretofore this responsibility has rested in a tight government monopoly. **And this extension is made on terms that emphasize the responsibility far more than they open any opportunity for economic gain in fulfilling it.** The revised Atomic Energy Act provides that:

1. Industry may now own and operate its own nuclear reactors, under license from the Atomic Energy Commission. And it may build and sell nuclear reactors for export.

2. Industry may use—but not own—nuclear materials at the discretion of the Atomic Energy Commission.

3. The Atomic Energy Commission will make available to industry scientific knowledge that may be useful in developing peaceful applications of nuclear energy.

4. For the first time, industry will have the right to patent inventions in the field of nonmilitary nuclear energy. However, "basic" discoveries must be made available to all companies in the field for a period of five years, after which they, too, will revert to normal patent status.

Two Kinds of Know-How

These provisions, despite the imposed limitations, represent the first positive step toward development of nuclear energy for peaceful applications in the United States. Potentially useful knowledge, previously locked in the minds of government scientists, will now be available to all those who are willing and able to put it to work for the good of mankind.

The advantages to be gained from enlisting the talents of American industry in the development of peaceful atomic applications are imposing. As *The* (London) *Economist*, Europe's leading economic journal, recently remarked, "The atomic scientists are in a position to surmise how atomic energy can be applied... but they lack the specialized knowledge of engineering design and operating technique just as industry itself lacks atomic knowledge." Now the engineers of private industry need no longer lack the atomic knowledge, and there is granted to them at least a restricted freedom to apply it to the solution of their engineering and operating problems.

But the new opportunity for private industry to find constructive uses for the science of nucleonics carries with it a grave responsibility. These uses must be so developed that they will benefit the people of all the free nations. It is essential that the United States, which pioneered in developing lethal uses for atomic fission, demonstrate to the world our paramount interest in its peaceful application. It would be a moral set-back to the free world almost beyond calculation if the Communists should be able to offer to the poorer nations of the world the benefit of low cost atomic power—provided by Communist technicians—while we concentrate primarily on building our stockpile of atomic and hydrogen bombs.

Race For a Peaceful Victory

Most of the experts are agreed that it may be many years—perhaps ten, fifteen or more—before the cost of electricity from atomic fission can be reduced to a level that will make it competitive with conventionally produced power in most regions of the United States. But most of the world is not nearly so fortunate as we are in power resources. Electricity, even at a cost far higher than the average that prevails in the United States, would be a blessing in many countries, and the nation that provides the technology to bring it into being will score a great moral victory.

The useful potential of nuclear energy is not restricted to the generation of electric power—although twenty years from now this use will be highly important to the power industry of the United States. Even with the limited research that has been done in this field thus far, the use of radioisotopes—the radioactive products of atomic reactors—is saving American industry an estimated $100 million a year. Commissioner Campbell of the AEC, who made this estimate, believes that these savings may well reach $1 billion a year within ten years. Radioisotopes are already at work in industries ranging all the way from paper manufacturing, where they measure paper thickness, to pipeline transportation, where they mark the dividing lines between shipments of different products (at an estimated saving of $500,000 a year). Medical applications of these same radioisotopes hold promise of longer and more comfortable lives for those who are stricken by cancer and other diseases.

Above All a Challenge

The new Atomic Energy Act is a crucial stride toward the day when all these benefits—and undoubtedly others not yet revealed by research—will be realized. But it is a step that is essentially permissive. It still leaves it to private industry for the most part to decide what is to be done and how soon.

The new act is thus, above all, a challenge. It confers on private industry the responsibility to assume a leading role in the development of peaceful uses for nuclear energy, a step long urged by NUCLEONICS, a McGraw-Hill magazine devoted to atomic energy. To achieve a success in this task that will measure up to the requirement of the national interest, this development must command all the resources and ingenuity that private enterprise can apply—and do so without promise of glittering prizes surely to be won. **But now that the responsibility has been defined and the challenge offered, American industry will, we believe, measure up to its grave and mighty import.**

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

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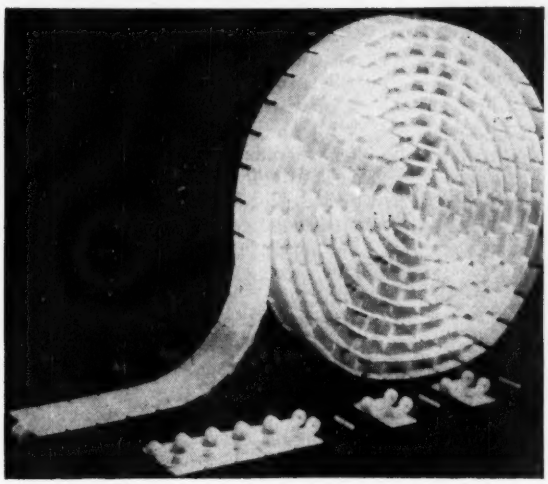
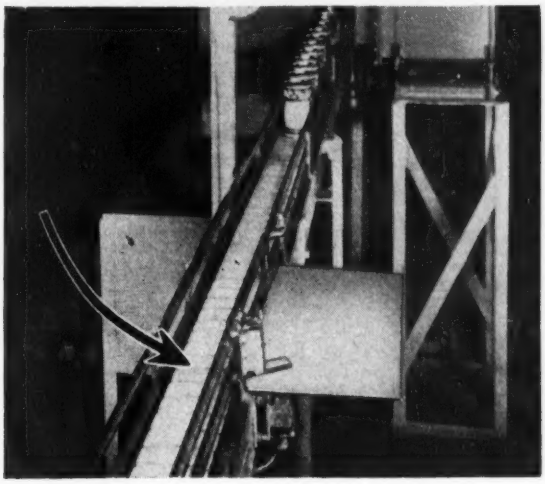
NEW EQUIPMENT & SUPPLIES





Flat Top Chain Conveyor Made of Nylon

Of interest to canners, brewers, bottlers and dairymen is this new flat top chain conveyor made of "Zytel" nylon resin.

Named "Nylite" and intended for use where corrosion resistance is required, the conveyor chain needs no lubrication, reduces amount of power required for operation through its light weight and low coefficient of friction, and is expected to give long wear. In addition, resilience of plastic provides quiet operation and minimizes danger of damage caused by transmitted shock or burred surfaces.

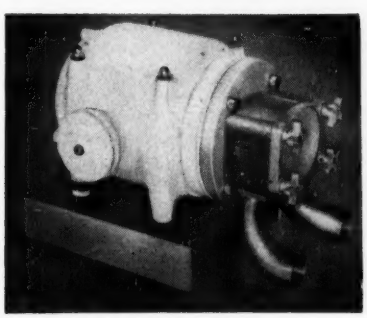
Material is resistant to food acids, alkalies, and brine solutions, and molded links can be steam sterilized. Conveyor's smooth operation without lubrication eliminates possible product contamination from this source.

Because Zytel is readily molded into complex shapes, manufacturer (Du Bois Plastic Products Co., Buffalo, N. Y.), has been able to simplify design without loss of performance. Ease of assembly is achieved through use of only two elements, links and pins. The latter themselves provide a safety factor since they are designed to break in case of jamming. New links or pins can be inserted in less than a minute; only a hammer and drift pin are needed for this operation.

Installations have already been made. One, in operation, since mid-June, carries over 250,000 cans of beer per 8 hr. day—and for more than half of this time has run double shifts.

Chains are available in link widths of 3¼ and 4½ in. They are intended for regularly spaced ways of 1⅛ and 1¾ in. widths.—*Fenco, Inc., 125 N. Racine Ave., Chicago 7, Ill.*

Circle 141A in Reader Service Card



Gentle Action Marks New Sanitary Pump

Resistance to corrosion, gentle pumping action reported to prevent churning or foaming of liquid, and ease of cleaning are features claimed for this new sanitary pump. Named Sani-Flex, it will handle viscous materials or abrasive slurries with minimum maintenance troubles.

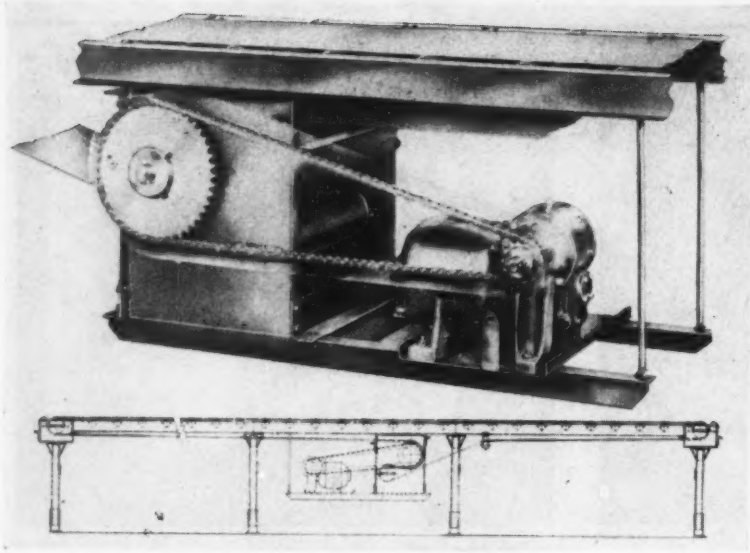
Action of pump isolates fluid from all actuating mechanisms or rotating parts. Pumping is accomplished by a progressive squeegee action of fluid confined to smooth and polished areas of product zone, inside surface of a Type 304 or 316 stainless steel housing and outside surface of a tasteless and odorless neoprene or other approved synthetic or gum rubber liner. These are only two parts in contact with fluid, since rotating eccentric pump shaft, an integral part of motor shaft, is isolated within inside of flexible liner.

Flanges on liner straddle both sides of housing and offer a complete separation between rotating mechanism and product. Design eliminates need for stuffing boxes, packing glands or shaft seals avoiding possibility of external leakage, and insuring against contamination of product from lubricants or other external sources. Absence of check valves adds to simplicity of construction, avoiding stickiness and valve wear.

Pump meets specification of the more recent Sanitary Code Requirements.

In line with minimum number of parts, provision is made for ready disassembly for daily cleaning. Removal of four stainless steel wing bolts releases end plate, exposing inner parts for inspection. Only wearing part, Flex-i-liner, is quickly replaced. Pump is self-draining since port openings at base permit drainage from fluid passage by gravity flow. There are no internal sharp corners or crevices in fluid passage. All surfaces are machined smooth. Inlet and outlet connections conform with 3A sanitary requirements or are furnished with hose connections if desired.—*Vanton Pump & Equipment Corp., Empire State Bldg., New York City 1.*

Circle 141B on Reader Service Card



Drive Unit Converts Gravity to Live Rollers

Roller gravity conveyors can readily be converted to belt or live roller conveyors with use of this new combination medium duty center drive and take up.

Unit is made in widths of 12 to 24 in. in 2 in. increments. Widths wider than 24 in. can be obtained on special request. Gear head motors, ½ to 1 hp. are furnished as standard with a maximum effective pull of 300 lb. Combination unit is designed to use regular 3-ply belting.

Accessory equipment to make complete belt conveyor systems includes end pulley assemblies, supports, hangers.—*Lamson Corp., Box 511, Syracuse, N. Y.*

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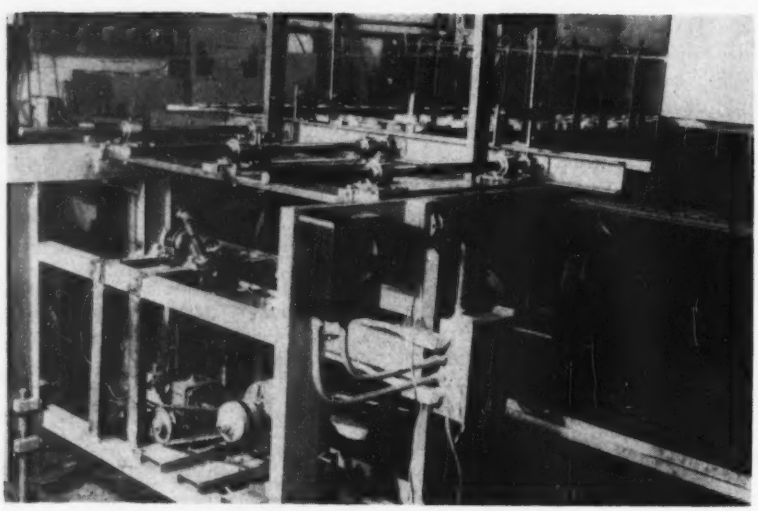


Automatic Unit Transfers Containers in Rows

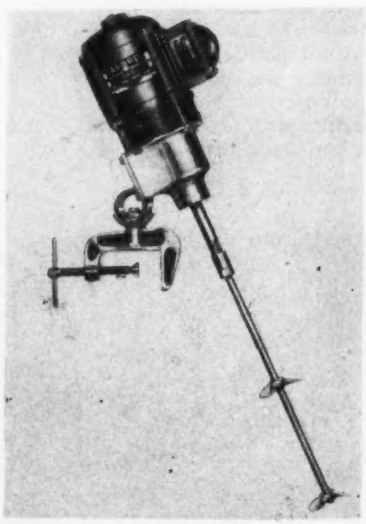
Any straight-sided bottle, jar, can or cardboard container, filled or empty can be handled by this Select-O-Count broad belt infeed unit. It will transfer them from a straight single line into rows the width of which is equivalent to any number of containers desired. It is adjustable to meet changes in speed of transfer as well as size and numbers of cans per row, and will accurately count and feed each counted row onto a broad belt conveyor.

Typical uses are for feeding wide belt conveyors; jar coolers; pasteurizers; and storage lines. It may also be used to push a row of containers onto a parallel conveyor for feeding straight line fillers or case packers.

Standard unit will feed a 4-ft. belt, but can be made to feed a minimum belt width of 2 ft. or maximum of 6 ft. It operates as follows:

1) The counter is pre-set for number of containers per row by turning its dial indicator to the desired number. 2) Power unit is turned on after cross-conveyor and wide belt conveyors are moving at operating speeds. 3) The Select-O-Count is then started with switch located at counter. 4) After predetermined number of containers pass by counter switch a solenoid gate closes, preventing any more containers from entering the unit, clutch is engaged by its solenoid, and bar pushes containers into wide belt unit as lane guard pivots up out of way of path of containers. 5) While pusher bar returns, micro-switch is closed momentarily by rocker arm to reset counter, open solenoid gate and disengage clutch. 6) Cycle repeated thereafter with operations 4 and 5. —*Island Equipment Corp. 27-01 Bridge Plaza North, Long Island City 1, N. Y.*

Circle 142B on Reader Service Card



Portable Propeller Mixer Has Adjustable Shaft

This newly designed portable propeller type mixer features an adjustable shaft with an outboard ball bearing support. These outboard bearings are of the self-aligning type prelubricated, and sealed against lubricant drip and leak.

Heavy-duty housing and outboard bearing support assures added stability

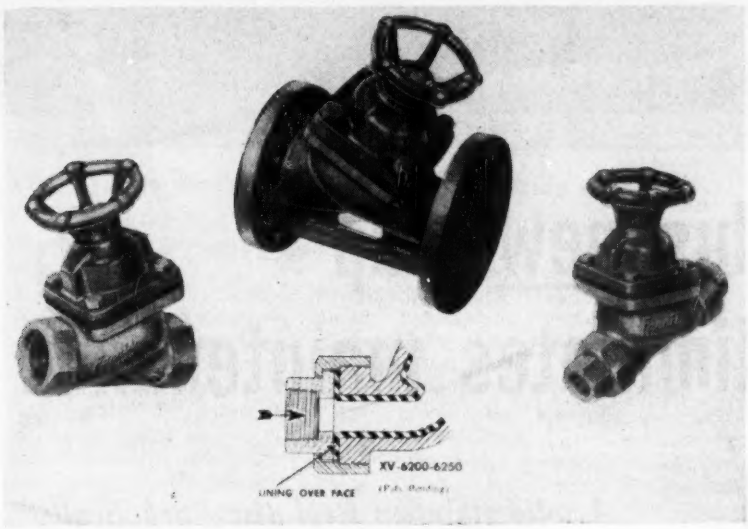
and ruggedness for continuous operation. A hollow tube and chuck arrangement using a locking sleeve provides quick positive shaft adjustment that does not loosen or jam.

The two accurately balanced three-bladed propellers are movable over full shaft length, allowing exact adjustment for best mixing results consistent with batch depth. Many types of propellers are available for special purposes including saw-toothed, cut-out, perforated, and cage beaters.

Standard shafts and propellers can be supplied of stainless steel, special alloys. Longer or shorter shaft lengths may be ordered to suit specific requirements.

Clamp permits shaft and propellers to be rotated 360 deg. horizontally and 90 deg. vertically allowing any position for best mixing action. Available in direct drive or gear drive models in sizes from 1/20 to 7½ hp.—*Alsop Engineering Corp., 54 Stevens St., Milldale, Conn.*

Circle 142C on Reader Service Card



Diaphragm Valves For Corrosive Liquids

Greater port capacity permitting use of smaller piping with lower pressure drop, plus connections that are reusable in maintenance replacement, marks the design advance in the X-V Series of diaphragm principle valves.

Because valves are designed primarily for such applications as shut-off, throttling and control of acids and chemicals in corrosive or abrasive service, many of the types are lined. Engineers took this into consideration and provided generous-size body areas and oversized ports, resulting in high capacities.

Among features is a novel union (patents pending) which allows lining to come up over face of union and to come in contact with union tail piece, of special material. For maintenance replacement, valves can be supplied without tail piece and union nut, providing a saving for these parts which can be reused.

Principal design feature provides individual functioning of diaphragm and disk. Thus sealing mechanism and seating disk are accomplished separately. As a result, diaphragm is not subjected to seat wear and abrasion. In severe applications, this makes it possible to close valve in event of a diaphragm failure.

Disk is constructed with ample covering surface material for closure over fine grits and ample thickness for long life and minimum maintenance. Metal backing insures dependable, air-bubble tight closure. Vacuum service is readily handled.

Other advantages include replaceable disk, easy assembly and disassembly, corrosion resistant materials, easy-to-read valve position indicator, quick and easy operation and extra body strength provided by a rib support.

Valves are manufactured with bodies of cast iron, 316 stainless steel or Hastelloy "C". They are available either unlined or lined with same material as diaphragm and disk. Diaphragms are of rubber, Neoprene, Kel-F or Buna-N; disks are of rubber, Neoprene, 316 stainless steel, Kel-F or Hastelloy "C". Sizes range from ½ through 4 in. Connections are flanged, screwed or union. All valves are designed for pressures up to 150 psig. at maximum temperature of 180 deg. F.—*Farris Flexible Valve, 516 Commercial Ave., Palisades Park, N. J.*

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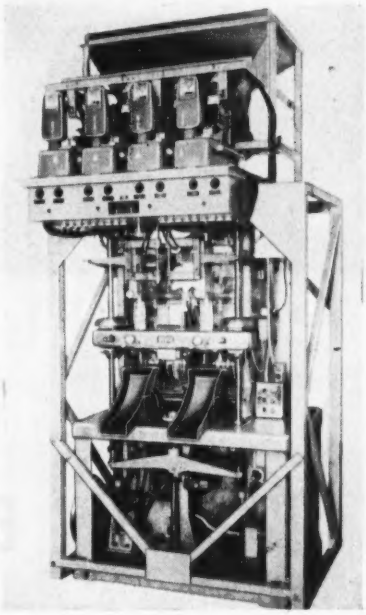


Improved Machine Handles 60 Packages Per Min.

Fast and accurate packaging of items, not suitable for volumetric filling is reported with use of this improved machine.

Feature of new unit is addition of a battery of net weight scales especially manufactured for this machine. Use of multiple scales permits unit to maintain filling speeds up to 60 packages per minute. Accuracy of fill is assured by means of bulk and dribble feed. Major portion of product is first fed into weighing bucket and precise weight is then reached by dribble feed.

Machine is particularly suited for packaging of such items as mixed nuts, odd shaped candies, crackers and cookies. Net weight scales are built to fit any new or existing standard model machine.

Unit fills and heat seals packages from any approved heat sealing film, paper or foil. Package limits range from 1⅜ in. wide by 1 in. long to 5⅞ wide by 12½ in. long.—*Stokes and Smith Co., 4992 Summerdale Ave., Phila. 24, Pa.*

Circle 143B on Reader Service Card

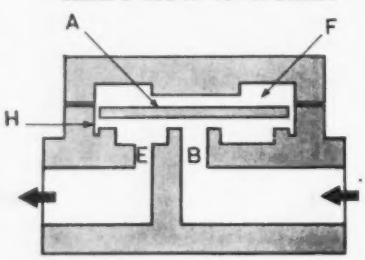
SARCO
Thermodynamic
STEAM TRAP

ACTUAL SIZE

this new trap virtually eliminates maintenance

SOLID STAINLESS STEEL DISC ACTS AS VALVE HEAD

HERE'S HOW IT WORKS!



Air and/or condensate raise valve seat disc A, discharge thru E. When steam follows, greater velocity causes it to strike body at H thus building up pressure in chamber F. This causes disc to seat, closing tube B. As pressure in F decreases by condensation, pressure in tube B raises disc and cycle is repeated.

The Sarco Thermodynamic Trap has proved successful on steam mains and separators; headers and soot blower pipes; engine and turbine stop valves, separators and casing drains; alternate heating and cooling applications.

2098-B

A solid stainless steel disc—practically indestructible—is the only moving part!

MOST striking feature of the Sarco *Thermodynamic* Trap is its simple maintenance-free design. There's only one moving part – a solid stainless steel disc that practically lasts forever. There are no other moving parts to wear out or cause trouble.

Condensate, air and steam act directly on the disc valve which opens to discharge condensate and air – snaps shut to contain steam. There are no mechanical devices required to operate valve (see diagram at left). That means practically endless trouble-free operation.

Other advantages: small size, easy installation, not affected by shock or vibration, immunity to corrosive elements with all wearing parts stainless steel, same valve head and seat for all pressures to 600 psi and temperatures to 950° F.

Check these advantages to your own satisfaction at absolutely no cost. We'll send you a trap for trial. All you do is fill out the coupon and mail it in.

SARCO COMPANY, Inc.
Empire State Building, New York 1, N.Y.

MAIL COUPON TODAY FOR TRIAL

Sarco Company, Inc., Empire State Bldg., New York 1, N.Y.
Gentlemen: Please send me a Sarco Thermodynamic Trap for a 60-day trial, requirements as checked.
Size: ½"... ¾"... 1"... Operating Pressure:.....psi

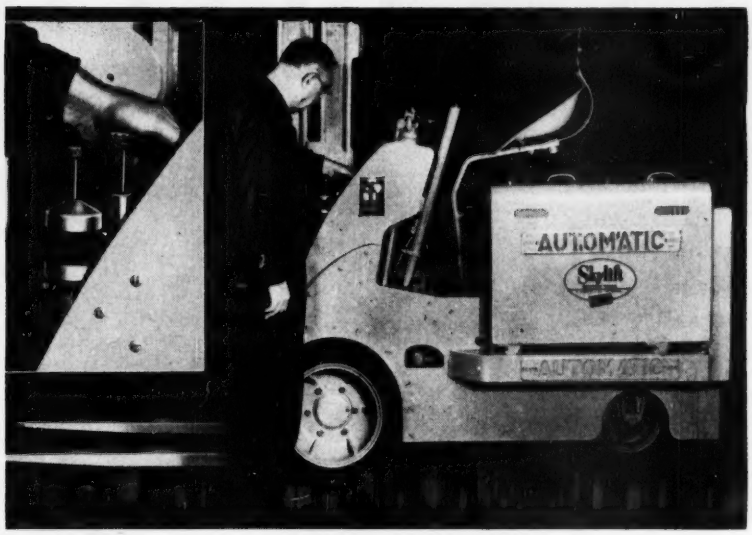
For installation on.....

NAME_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____



Lift Trucks Have Centralized Lubrication

These new industrial fork lift trucks now have built-in centralized lubrication.

The system will assure improved performance, convenience, safety and extended trouble-free service. Centralized system is manufactured by Lincoln Engineering Co.

As installed, lift truck operator lubricates all vital steer-axle bearings simultaneously, with a single stroke of control lever. Such complete flushing and lubrication of bearings eliminates down-time and lubricating man-hours.

System is said to maintain a constant grease film at bearing points—thus greatly increasing bearing life as well as cutting cost of replacing bearings due to improper and inadequate lubrication.

Firmly mounted in position for extra-convenient operation, the assembly has a lubricant reservoir with sufficient capacity for approximately 120 cycles of system.—*Automatic Transportation Co., Chicago.*

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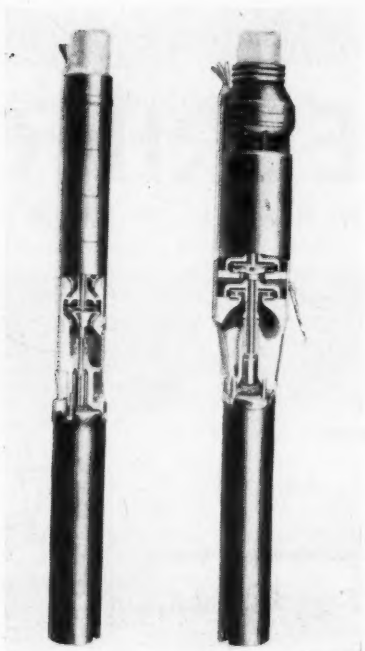

Submersible Turbine Pumps Require No Priming

Quiet operation, minimum power and no priming requirements are advantages cited for these new submersible turbine pumps. Entire pumping unit is made of corrosion-resistant materials for operating completely submerged in the well water. Capacities range from 600 to more than 7,000 gph. for wells 4 and 6 in. ID or larger.

Moving parts of pump are water cooled and water lubricated. No running seals are required as motor is designed to operate in water. Windings are enclosed permanently in a stainless steel case and durable, waterproof cable is connected with a water tight fitting.

As tank and control may be located away from well, if desired, and service line placed below ground, no pump house is required. Pumping unit, submerged in well water, is protected against freezing and tampering.

Easy, low cost installation is assured as motor and turbine type pumping unit are completely assembled at factory—ready for placing in well. Enclosed bronze impellers are securely keyed to stainless steel pump shaft which is protected through bearings with stainless steel sleeves. Impellers are low thrust type, accurately positioned in each bowl or diffuser, and require no adjustment. Stainless steel motor coupling is splined for accurate alignment.

Pumps, for wells of 4 in. ID have all bronze turbine type bowls with streamlined waterways. Close fitting high lead bronze bearings are located in each bowl. Pumps for wells of 6 in. or larger have bronze diffusers to efficiently guide water from each impeller to next. Diffusers are accurately aligned in a heavy tubular brass housing with bronze bearings located at proper intervals for smooth operation.—*Deming Co., Salem, O.*

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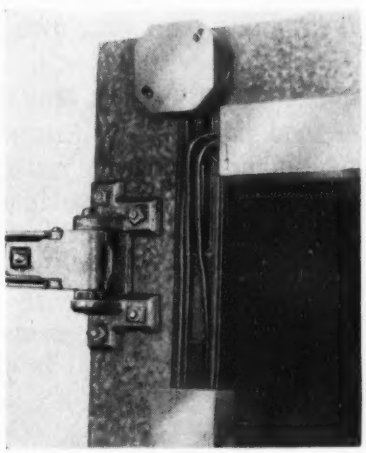

Eliminates Ice On Frames Of Low Temperature Doors

Formation of ice on frames of low temperature doors is reported prevented with these new heater cables. Thermostatic controlled, cables are embedded in frame where gaskets of door make contact. They are laid in asbestos lined channels cut in the casing. If desired, they may also be embedded in sill.

In operation, heater cables keep gasket contact areas of frame above due point temperature. This prevents moisture condensation, eliminating formation of frost or ice at excessively low temperatures, even below −50 deg. F.

While prolonging life of gasket, cables are said also to reduce other

SANITATION

You can get more help on it by reading about all kinds of food plants. In 1931, ultraviolet rays were used experimentally to kill micro-organisms. But by 1936, FOOD ENGINEERING was reporting the use of ultraviolet in meat plants, then in bakeries. By 1941, breweries had adopted it. In 1946, black light (a part of the ultraviolet spectrum) came into wide use for detecting rodent contamination in many kinds of foods. Today, ultraviolet is used by jam-and-jelly plants, olive packers, and many others.

That's typical. As better sanitation tools develop, the "tidal wave of engineering" takes them from one kind of food plant to another. So you can get the word sooner by reading about sanitation in other kinds of food plants than your own.

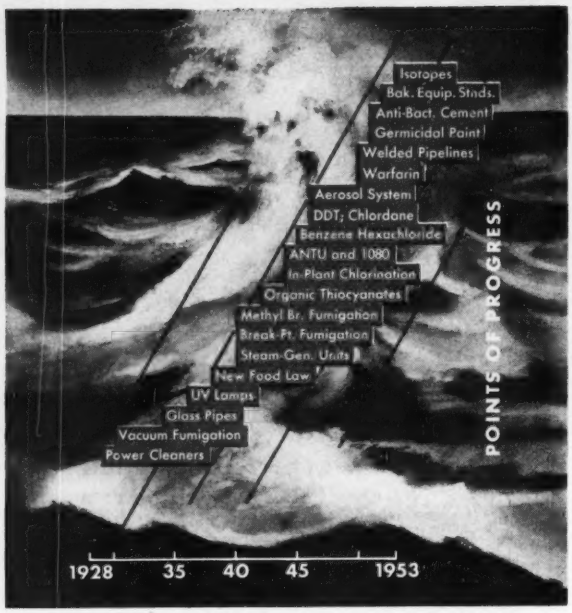

Chart shows how "tidal wave of engineering" in food plants has brought new sanitation tools in 25 years.

How to keep up with sanitation in all kinds of food plants. FOOD ENGINEERING reports food-plant sanitation methods the way it covers every plant management, engineering, and operating subject. Its stories on *your* kind of plant are unexcelled—in accuracy and detail. Equally important, FE reports on *other* food plants, bringing new ideas just as universal as ultraviolet light.

Chances are your biggest competitors endorse this plan. For FE has more subscribers than any other food-plant magazine . . . people who want the most complete and accurate stories. People who no longer sit behind the artificial walls that have divided food into many "industries," shutting out interchangeable new ideas. *Try* it! Look over *your* wall with FOOD ENGINEERING.

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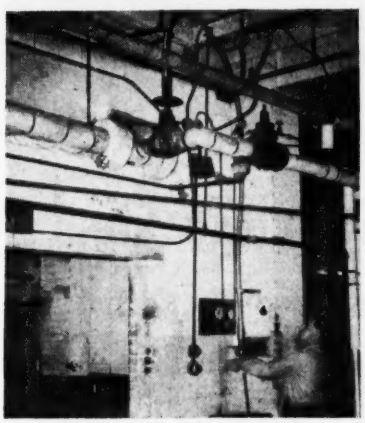
maintenance costs on doors and frames. Whole contact area of gasket is exposed to heat of cable. These are completely encased in a lead sheath and, along with a thermoswitch, are set in flush with surface of frame. They are concealed from view by a stainless steel cover plate against which door gasket makes contact. Thermoswitch is adjustable and accessible for changing temperature setting if desired. A simple turn of a screw driver controls setting.

Door frames with heater cables installed are available as optional features on all freezer doors, low-temp. doors and super freezer doors. They are also available for horizontal sliding, vertical sliding, and package passing doors.

Cables are also supplied in frames for all types of door sills.—*Jamison Cold Storage Door Co., Hagerstown, Md.*

Circle 145C on Reader Service Card



Flexible Shafting Offers Remote Valve Control

Simple, remote control of valves is attained with use of flexible shafting. In illustration, a steam valve with an 8 in. handwheel is being controlled by a 1 in. flexible shaft with a 9 in. plastic handwheel at other end.

Before shaft was installed, whenever valve was opened or closed, operator had to climb up a ladder. Flexible shaft makes this operation both quicker and safer.

Valves as large as those with 27 in. dia. handwheels may be controlled with flexible shafting which can be as long as 50 ft. Flexible shafting makes it possible to control many valves in plant from one central station upping safety and speeding operations.—*Stow Mfg. Co., Binghamton, N. Y.*

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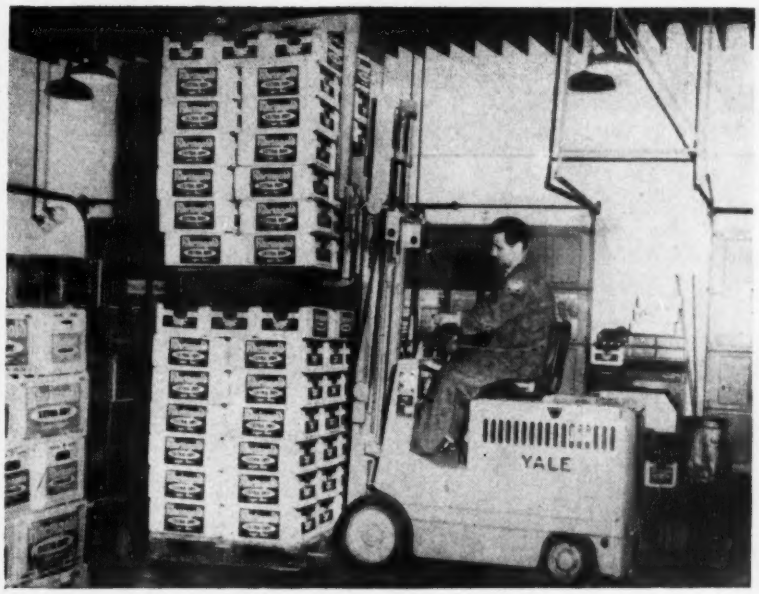

Handling Speed, Safety Upped by Stabilizer

Fast, safe carrying and stacking of palletized loads of comparatively small units or uncased goods is reported with use of a fork lift truck equipped with a hydraulic load stabilizer.

Hydraulically controlled device provides proper pressure for vertical clamping of loads and minimizes effect of side slippage and vibration.

Controlled by a lever at operator's fingertips which actuates hydraulic cylinder for clamping and unclamping, stabilizer is faced with rubber padding for protection of load surfaces. Unit is self-articulating to permit pad to grip flush with load top. Manual vertical and horizontal adjustments are easily made, enabling unit to effectively handle many different load heighs and widths.—*Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15.*

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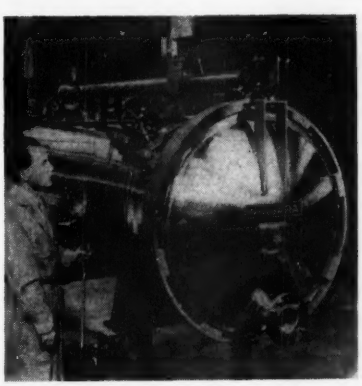

Hydraulic Cover Eases Filter Operations

A hydraulically operated, quick-opening cover is a new operational and safety feature on horizontal and vertical filters.

Quick effortless opening and closing of filter tank, even seating of cover, and reduced maintenance costs are advantages claimed for new accessory.

Actuation of hydraulic pump transmits pressure to two hydraulic cylinders which rotate locking ring. Resultant pressure of cover against a gasket ring seals filter securely. Reversing motion of locking ring releases cover so that it can be removed. This type of closure provides a safety feature since cover cannot be opened unless wedges on locking ring and cover clear each other. Pressure is automatically released at first movement of wedges.

Because of uniform pressure exerted by hydraulic system, as compared with "spot" pressure exerted by hand wheels and eye bolts, even seating of cover against gasket is assured. Also, repair and replacement of hand wheels and eyebolts is completely avoided on the unit.

New cover is standard equipment on horizontal filters and is available at extra cost on vertical filters.—*Niagara Filters Div., American Machine and Metals Inc., East Moline, Ill.*

Circle 147C on Reader Service Card

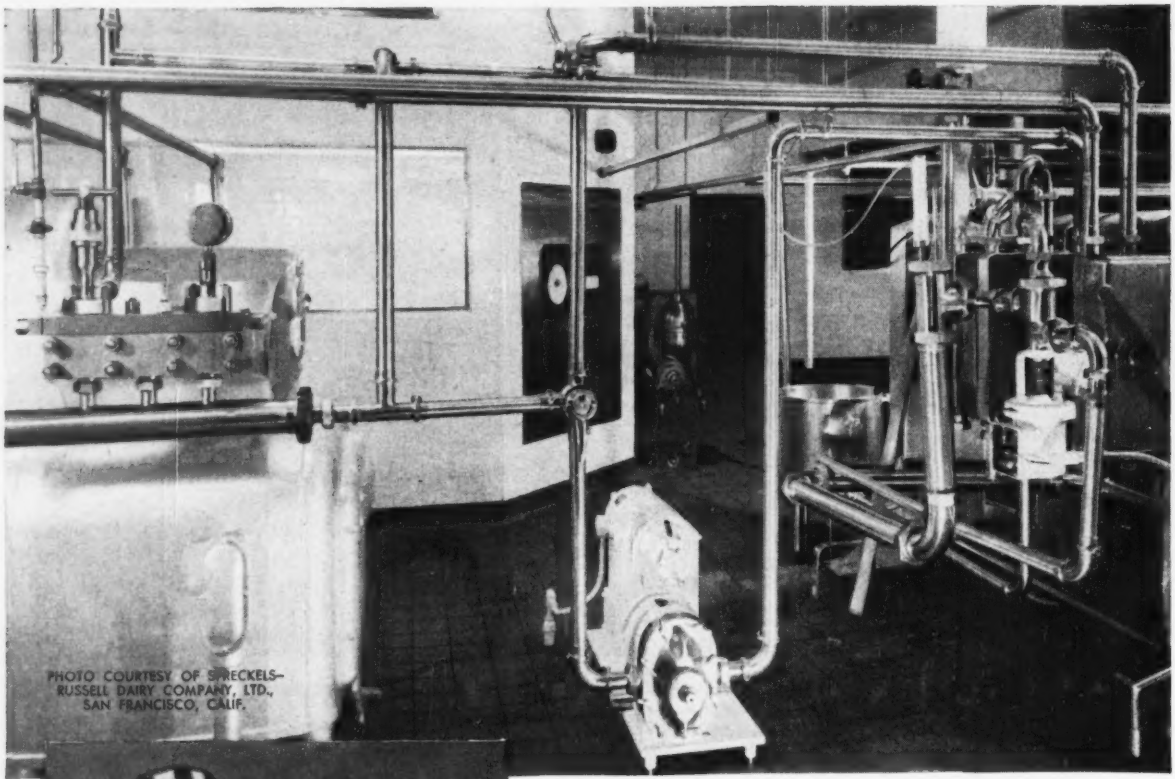

PHOTO COURTESY OF SPRECKELS-RUSSELL DAIRY COMPANY, LTD., SAN FRANCISCO, CALIF.

Special short toggle clamp and hand tool used for permanent "C-I-P" lines, preventing accidental opening or tampering with joints.

Tri-Clamp tee—one of complete line of fittings available in 1", 1½", 2", 2½", 3" and 4" sizes.

Tri-Clamp 90 degree sweep ell available in all sizes.

Tri-Clamp Three-way lift type plug valve. Other valves available in complete range of types and sizes.

See your nearest TRI-CLOVER DISTRIBUTOR.
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. . . another dairy installs

Tri-Clover Stainless Steel

CLEANED-IN-PLACE LINES

. . . this time it's Spreckels-Russell, progressive San Francisco dairy that has recognized the time and money-saving advantages of using TRI-CLAMP Sanitary Stainless Steel Fittings, to provide leak-proof, cleaned-in-place liquid lines.

Here, as in other dairies throughout the country, it was a simple matter to utilize existing sanitary fittings, and to extend lines through the use of simple Tri-Clamp adapters and snap-on clamps. The result is a complete, cleaned-in-place installation, which can be easily and quickly disassembled whenever necessary.

For further details on the complete line of TRI-CLAMP fittings, made only by TRI-CLOVER, write for literature.

LADISH CO.
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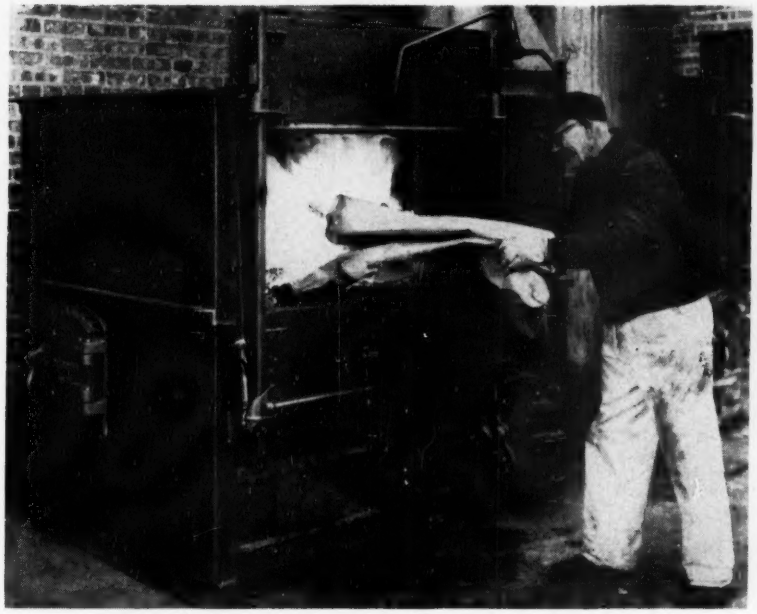
KENOSHA WISCONSIN

THE Complete LINE

S254



Portable Incinerator Handles Bulky Objects

The extra large door on this new portable incinerator simplifies charging bulky objects such as large boxes and cartons. Door is of split-guillotine type, counter-balanced for effortless operation.

Basic design is suited to the incineration of all average dry waste. Modifications of this design are readily made for disposal of garbage, and other wet refuse. Capacity of three standard sizes ranges from 200 to 450 lb. per hr.

Another significant feature, according to maker, is long gas travel provided by design, with numerous velocity and direction changes for high combustion efficiency. Other features include a separate settling chamber, permanent steel skids, and a top stack outlet shortening overall stack length required. Stack, an optional item, is self-supporting.

Incinerator has steel casing for durability, and manufacturers' own monolithic refractory lining.—*Plibrico Co., 1800 N. Kingsbury St., Chicago 14, Ill.*

Circle 149A on Reader Service Card

Explosion Proof Lamp For Tank Inspections

Flammable chemicals in tanks can be safely observed with use of this explosion-proof pendant tank light, Type EV 2375. When equipped with a Type R 75w., 120v. spot lamp and suspended over a tank porthole, the new fixture illuminates the surface of the liquid inside for easy observation.

Machined from cast aluminum, the joints of 12¼ by 6⅞ in. fixture are threaded and completely flame-tight. Joint is gasketed as additional protection against entry of dirt or liquids. Heavy glass lens is heat and impact resistant. A separate unit, fixture's lamp receptacle is capable of absorbing severe shocks without damage. By employing a type EC flexible fixture support, lamp may be swung out from tank porthole for relamping.

New fixture qualifies for use at Class I, Groups C and D hazardous locations. When installed either in a level or base-up position, it is suitable for Class II, Groups E, F and G locations. Fixture hub sizes are ½ and ¾ in.—*Crouse-Hinds Co., Wolf at Seventh North Sts., Syracuse, N. Y.*

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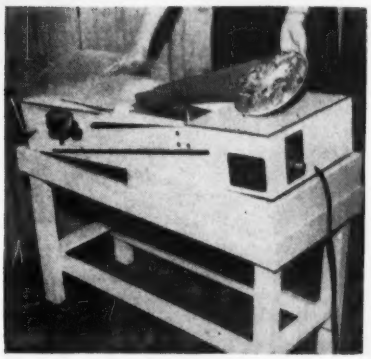


Semi-Automatic Unit Speeds Bagging

Fruit, vegetables, bakery, dairy, meat products and others—bulky, flat and/or round—can be speedily bagged with use of this new semi-automatic machine. Unit will handle bags of all kinds — paper, cellophane, pliofilm, glassine, polyethylene and others in gusset, plain or flap types.

No special training or break-in period is necessary to run this simple, compact machine. Two easy motions complete the package operations in seconds. Known as the Speedy Bag Packer, the unit is equipped with pneumatic auxilliaries which greatly accelerate bag-opening effecting appreciable labor savings.

Machine has two basic functions: It opens the bag through the assist of ratio air pressure and secondly it makes possible the easy loading of the product into bags. Packager now comes in ten standard models. It will handle bags ranging in widths from 4 to 18 in. Many bags, such as lip type open automatically with this unit. Others, such as flat-cut or gusset open with a slight assist from the operator. Speed-ups in many industries by packaging personnel are claimed to have been upped from 150 an hr. by hand to over 1,000 per hr. with the aid of the packager.

Space required for the machine is only about 4 sq. ft. Its light weight makes the unit readily portable.—*Errich International Corp., 286 Fifth Ave., New York City.*

Circle 149C on Reader Service Card

MONOCALCIUM PHOSPHATES FOR LEAVENING
SODIUM ACID PYROPHOSPHATES FOR LEAVENING
CALCIUM PHOSPHATES IRON PHOSPHATES FOR MINERAL ENRICHMENT
DISODIUM PHOSPHATE FOR BUFFERING
PHOSPHORIC ACID FOR ACIDULATION
IT PAYS TO SEE VICTOR

PHOSPHATES FOR LUNCH?

Well, hardly! But phosphates *do* play an important part in the production and processing of many of the foods you enjoy. The bread that undergirds the meal is made more nutritious with calcium phosphate. The salt that seasons is made free-flowing with tricalcium phosphate. Instant puddings are smoother because disodium phosphate aids emulsification.

There are more, many more uses for the amazing phosphate family in the processing of foods. Sugar, soft drinks, cake mixes, flour, yeast, puddings, cheese, evaporated milk, cereals, and candy are some of the food products that have benefited from the application of a Victor phosphate.

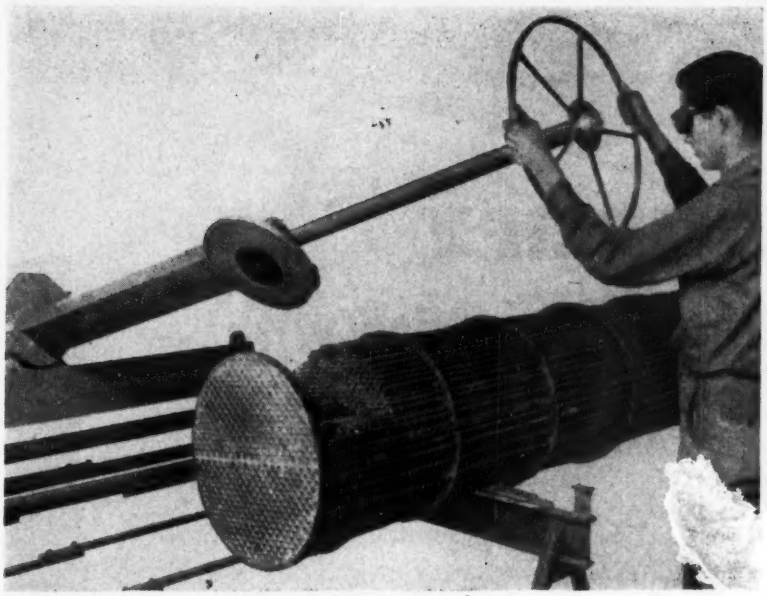
For more than 57 years Victor has been a leader in the production of food-grade phosphates. You may be certain that Victor will know if a phosphate can give your product or process an "assist." Your inquiry will be welcomed and promptly answered.

VICTOR SERVES THE FOOD INDUSTRY

Ammonium phosphates—manufacture of yeast, vinegar, yeast foods, pH control of soda crackers, bread improver . . . calcium phosphates—mineral enrichment, leavening agents for self-rising flour, self-rising corn meal, pancake flour and prepared mixes; baking powder. To prevent caking of salt, soda and sugar . . . iron phosphates—iron enrichment . . . phosphoric acid—manufacture of yeast, sugar, soft drinks, imitation jellies, gelatin . . . sodium acid pyrophosphate—baking acid in prepared mixes, doughnut flours, ingredient in baking powders.

VICTOR CHEMICAL WORKS

155 NORTH WACKER DRIVE CHICAGO 6, ILLINOIS



Slicer Cuts Retubing Time and Labor

Work involved in the retubing of condensers and heat exchanger coils is speeded and eased with use of a recently developed machine called the bundle slicer. An abrasive cut-off wheel mounted on a long, movable arm cuts through tubes to be replaced.

One man, using this machine can remove the tubes in 1½ hr. where the same job using conventional methods takes two men one or more days. Cutting wheel is a specially-designed, reinforced resinoid type wheel.

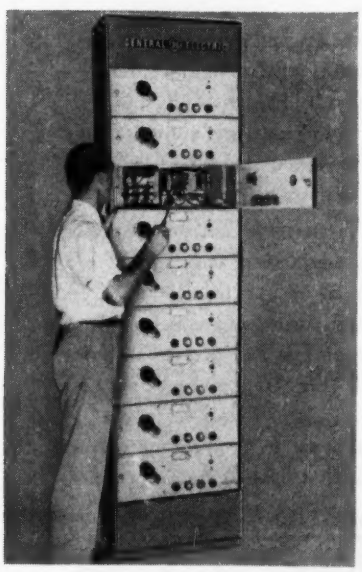
In operation, slicer cuts through tubes in steps, by bringing wheel down into bundle the full depth of cut next to header and then a few inches away. After removing cut-off tubes, operator continues to a greater depth until entire bundle is cut through. A principle advantage of abrasive cut-off wheel is that tubes are cut clean, without a burr. This eases knocking cut-off ends out of tube sheet prior to retubing.

When wheel is turned over between left and right side cuts, motor automatically reverses rotation, keeping spark stream away from operator.

Design of the wheel makes it cut equally well in either direction of rotation. A 7½ hp. totally enclosed motor is used to drive wheel. The arm is counterbalanced in its construction so that operator can move it with a minimum of effort. Wheel guard is also counterbalanced so that it automatically reverses its position when arm is reversed to protect the operator.

As an example of its fast cutting ability, 1,000 ¾ in. Admiralty metal (copper alloy), tubes in a bundle can be cut in about 1½ hr. Although primarily designed for non-ferrous tubes, it works equally well on steel tubing.—*Ohmstede Machine Works, Beaumont, Texas.*

Circle 151A on Reader Service Card



Space Requirements Halved By New Control Centers

Compactness marks this new line of motor control centers, known as DA 7093. New center, according to maker's engineers, will save up to 50% in floor space. It will take nine NEMA size 1 starter units or six size 2 units in standard 90-in. trough without reduction in pull-box space. Starter units will be of either fusible or circuit breaker types.

Several additional design and construction features have been incorporated. A new center bus-ing arrangement frees pull-box space for wiring and increases vertical bus capacity from 300 to 600 amp. This same arrangement also makes available continuous main buses of 600 or 1200 amp. capacity in standard construction up through five sections. Trough is designed to take straight-in wiring to main lugs.

A separate insulator is furnished for each bus. All insulators are molded from material which has low moisture and high impact properties. Main buses are mounted in an edge-to-edge arrangement and vertical bus bars are spaced on 5 in. centers. Both of these innovations are said to afford increased short circuit capacity.

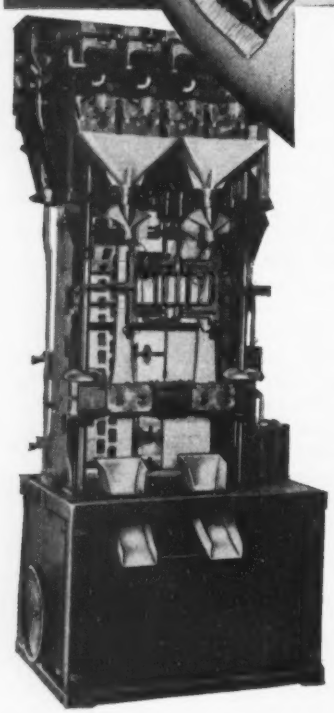
Also incorporated are newly designed split Type "B" terminal blocks which allow starter units to be removed or inserted without disturbing established wiring. Terminal connections are made by means of captive screws to ease installation.

In new design, across-the-hinge wiring to push buttons and indicator lights has been eliminated. Push buttons are mounted on unit door, and when pressed, actuate contacts by means of plunger-type extensions.

As a safety feature, a new method of grounding has been developed. Cadmium-plated gliders, mounted on underside of each unit, ground unit to cadmium-plated base upon which it rides. As an additional safety factor, this grounding occurs before unit engages bus bars. Same cadmium-plated base upon which each control unit rests also acts as an isolating barrier.

Units which are mounted on assembly's frame are inserted and withdrawn from center in a drawer-like operation by means of an L-shaped handle. A unit may be locked in withdrawn position for safety, and as an additional safeguard the operating handle can also be padlocked in either the "on" or "off" position.

Installation features include large



You can sit back and relax when you have a Transwrap machine on the job. For you have only *one* machine to maintain instead of several — fewer employees to supervise — no bag making, bag storage or bag inventory problems.

That's right — a Transwrap is a complete packaging plant in itself. It accurately measures the product (solids, granules, semi-liquids or liquids), forms a pillow-type or fin-seal package from material in roll form, then fills and seals the package. Production speeds range from 45 to 150 packages a minute. One operator can supervise up to three machines in top-speed operation.

LOWER COSTS AND A SALES-WINNING PACKAGE

It is easy to see why you can make substantial savings with a Transwrap. But equally important, you have a package that has outstanding sales appeal, and gives utmost protection to your product. The machine can print your advertising message directly onto the packaging material, or it can precisely register pre-printed material. Using transparent packaging material permits the consumer to view the product before buying. And Transwrap packages are hermetically sealed for long shelf life.

Foods, candy, drugs, chemicals, produce — you name the product and we can show you how a Transwrap machine will simplify its packaging, improve its sales appeal and *cut costs*.

Write for descriptive literature

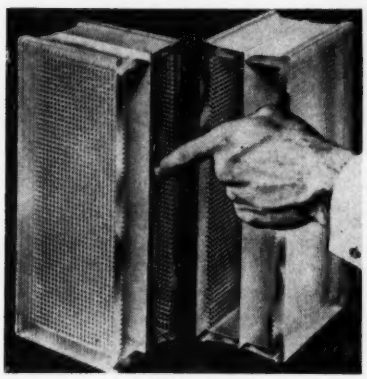
PACKAGE MACHINERY COMPANY • Springfield, Massachusetts

NEW YORK PHILADELPHIA BOSTON CLEVELAND CHICAGO
ATLANTA DALLAS DENVER LOS ANGELES SAN FRANCISCO
SEATTLE TORONTO MEXICO, D.F.

wiring gutters measuring 4¾ by 6 in. which are located in front for easy accessibility. Wiring straps are also provided, so gutter wiring can be held secure, tie-back fashion. Doors open past center (100 deg. to prevent closing while work on unit is in progress, and after unit has been removed, doors can be closed.

Each standard section measures 13½ in. deep by 24 in. wide. These sections can be installed back-to-back, with a combined depth of approximately 27 in.—*Distribution Assemblies Dept., General Electric, Plainville, Conn.*

Circle 151B on Reader Service Card



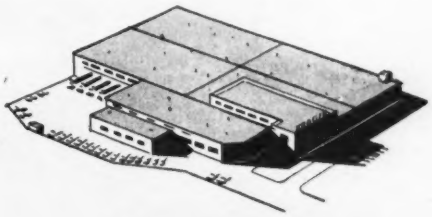
Diffusing Screens Used In New Glass Blocks

These new, double cavity glass blocks for exterior walls and roofs provide a soothing glow of daylight even in the harshest sunlight. Called "Suntrol," they are hollow blocks with pale green fibrous glass diffusing screens sealed into their centers.

The two partial vacuums in blocks keep out much of sun's heat, but psychological effect of color is probably more important. Two years of research in company's laboratories have demonstrated that light coming through green filter actually makes people feel cooler and more relaxed regardless of temperature.

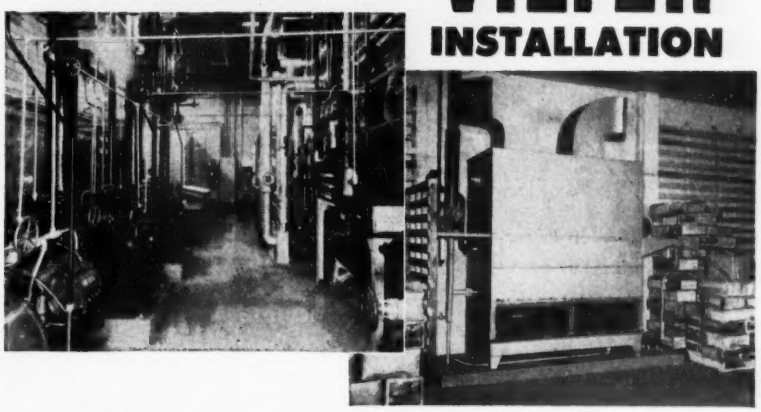
Suntrol is an addition to line of functional glass blocks which actually harness light rays to send them where they are needed. Light directing patterns throw light upward toward ceiling where it is reflected into all parts of room; light diffusing patterns distribute light in all directions; and special skylighting blocks spread even, comfortable lighting over wide floor areas. — *Pittsburgh Corning Corp., One Gateway Center, Pittsburgh 22.*

Circle 153A on Reader Service Card



Kroger

uses complete VILTER INSTALLATION



The modern new Kroger Company warehouse in Charleston, West Virginia is equipped completely with Vilter refrigeration units—a vote of confidence in Vilter refrigeration. As in a previous Kroger job, this new refrigeration system started operation with a minimum of attention and adjustment . . . a real blessing in getting a new plant off to a "flying" start.

This well-engineered installation consists of three VMC ammonia compressors, each selected for a definite temperature condition and cross-connected for flexibility. The freezer compressor, air conditioning compressor, and storage room compressor of 25, 40, and 50 h.p. sizes balance the specific load requirements of the various sections of the warehouse—including the Banana rooms, dry produce room, wet produce room, dairy cooler, and meat cooler. In addition to the compressors, there are Vilter brine spray-type air units, suction accumulators, evaporative condensers, and controls to complete this custom designed refrigeration installation. Vilter supplied the "complete refrigeration package" . . . thereby simplifying installation, operation, and maintenance problems.

Vilter understands how to design refrigeration systems to meet the specific needs of the job. That's why Vilter not only provides you with the "right" refrigeration . . . but knows how to cut down on the amount of costly space and also lower installation and operation costs. Furthermore, "among the men who know," Vilter has earned recognition as having a refrigeration system that keeps on running day in and day out—protecting your investment in meats, food, and produce—and doing so at lower operating and maintenance costs!

Vilter gives you a well-engineered product and a well-engineered installation. For dollar saving ideas and "top" refrigeration equipment consult your nearest Vilter representative.

Vilter

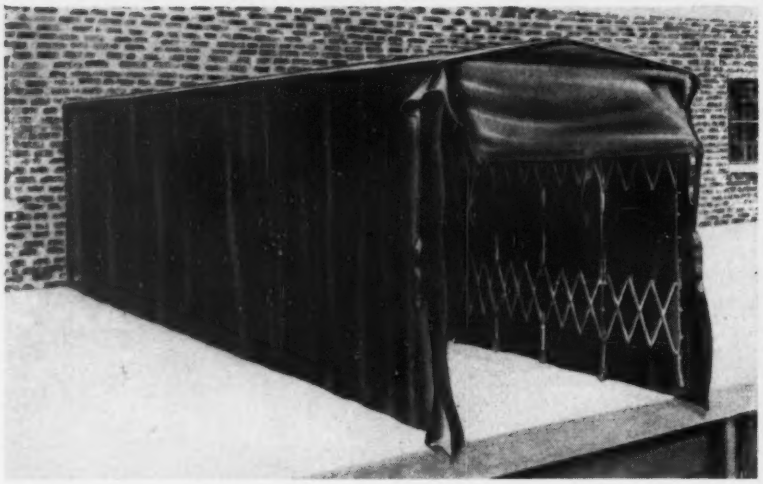
Your nearby Vilter Representative or Distributor will be glad to show how Vilter refrigeration can help you.

REFRIGERATION and AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, MILWAUKEE 7, WIS.

Air Units • Ammonia & Freon Compressors • Booster Compressors • Baudelot Coolers • Water and Brine Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pipe Coils • Valves & Fittings • Pakice and Polarflake Ice Machines

For more information, use coupon on last page.

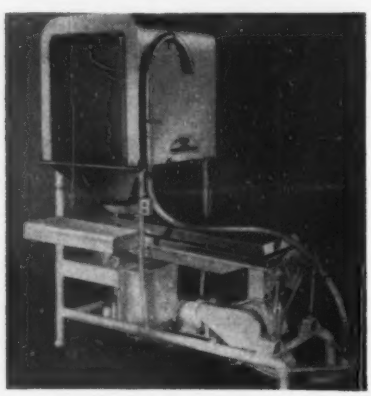


Folding Shelter For Extra-Deep Docks

Product and worker protection on extra-deep loading docks is provided with use of this shelter. Unit can also be used effectively to connect adjoining plants.

Called X-Tra-Span, it rolls on special wheels, literally snakes out from shipping room door across open docks to truck or box car. When not in use, it folds compactly back around shipping room door. Model is so designed that it is completely portable and could be moved from door to door. Units can be custom-built to any length but would be processed through assembly-line production setup.—*Atlas Industries, Inc., Chicago, Ill.*

Circle 154A on Reader Service Card



Sifts, Delivers Flour In Single Operation

In-plant handling of flour is simplified with this new Roball Airmatic It offers a modern, sanitary and economical method of sifting and pneumatically delivering clean, aerated flour to dough mixers, storage bins, or other points—all in a single operation.

One component of new machine is sifter which has a ball cleaning device and stainless steel cover and bottom pan. Sifted flour or other material is delivered to a low pressure air system, which carries material to its destination. Tailings are deposited in a removable drawer.

Unit requires only 4 to 12 lb. air pressure and only 10 cfm. to convey 100 lb. of material per min. without objectionable dusting. This low air consumption permits use of existing air line and precludes installation of supplementary air equipment.

Unit can be installed permanently or mounted on casters for operational flexibility. For permanent installations discharge tube can be fitted with a two-way or threeway diverting valve. These valve arrangements are popular for sifting and delivering variety flours to a line of dough mixers.

When handling variety flours in mixing room, maker recommends that flour be prescaled and then delivered by unit directly to mixer through canopy-cover rather than scale hopper.

For sanitation and easy cleaning, tubular construction is used throughout and all parts are accessible to sight and reach. Air system is self-cleaning.

A convenient bag rest facilitates dumping. Screen frames are easily interchanged. Stainless steel or flexible rubber tubing may be used for discharge.—*The J. H. Day Company, Inc., 1151 Harrison Ave., Cincinnati.*

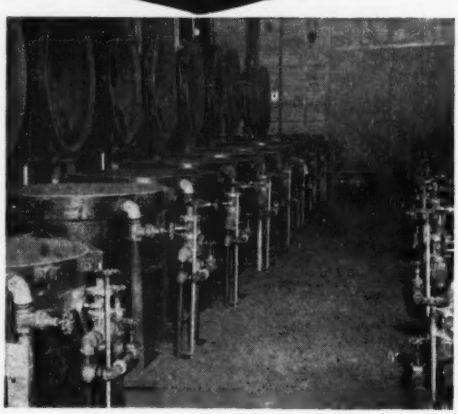
Circle 154B on Reader Service Card

WALWORTH VALVES on the job in the food industry

In addition to the valves featured on the facing page, Walworth manufactures gate, globe, angle, check, and lubricated plug valves; as well as pipe fittings. These are used extensively in the manufacturing and processing of foodstuffs. Shown here, for example, are groups of Walworth Bronze Gate and Globe Valves installed in a large eastern food cannery.*

There's a Walworth Valve to meet your particular requirements. See your Walworth Distributor or write: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

*Name on request



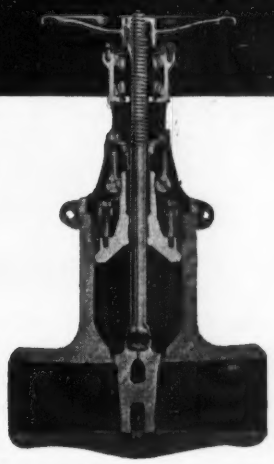
WALWORTH

PRESSURE-SEAL CAST STEEL VALVES

Better because ... **They have no bonnet flanges, bonnet bolts, or bonnet welds. Ideal for high-pressure, high-temperature steam service and corresponding boiler feed service, Walworth Pressure-Seal Cast Steel Valves weigh less, and take up less space than the flanged bonnet type of valves used for similar services.**

These are a few of the important advantages made possible by the design of Walworth *Pressure-Seal* Cast Steel Valves. Internal line pressure is utilized within the bonnet to maintain a tight, leakproof, body-to-bonnet connection under all normal operating conditions. The higher the pressure, the tighter the seal.

Ask for your copy of Walworth Circular 143. It gives detailed information, including sizes, dimensions, and specifications for all Walworth Pressure-Seal Cast Steel Valves.



Cross section of 8-inch Series 900 Walworth Pressure-Seal Cast Steel Gate Valve. Pressure-Seal Globe, Check, Angle, and Non-Return Valves are also available in Series 600, 900, 1500 and 2500 in a wide range of sizes.

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

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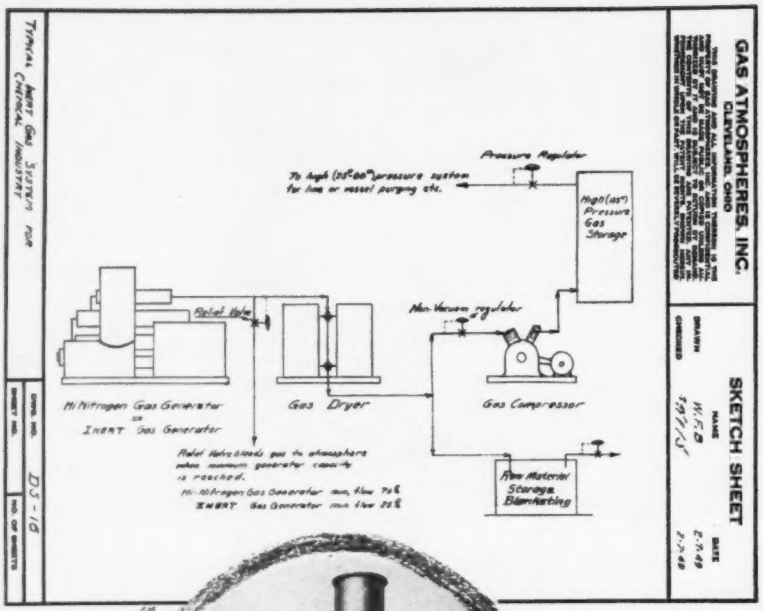
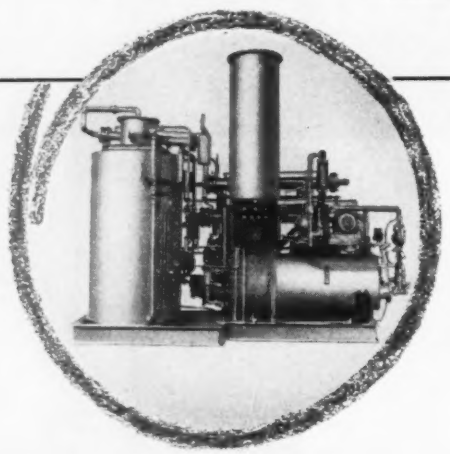
BETTER CANNING BEGINS HERE

More progressive canners every day are turning to inert gas packaging as the surest, most efficient method of modern food canning.


GAS ATMOSPHERES, INC.
CLEVELAND, OHIO
SKETCH SHEET
Pressure Regulator
To high (25#-60#) pressure system for line or vessel purging etc.
High (asr) Pressure Gas Storage
Relief Valve
Hi-Vacuum regulator
Hi-Nitrogen Gas Generator
INERT Gas Generator
Gas Dryer
Gas Compressor
Relief Valve blows gas to atmosphere when maximum generator capacity is reached.
Hi-Nitrogen Gas Generator min. flow 75%
INERT Gas Generator min flow 25%
Raw Material Storage Blanketing
DS-18



The plan and generator shown here are saving thousands of dollars for a leading food canner.* And he reports higher product quality.

*Name furnished on request.

Gas Atmospheres Inc. is one of the leading producers of gas generation and gas purification equipment for the food packaging industry. Regardless of amounts of gas required, Gas Atmospheres' engineers and packaging experts can show how you can save the cost of the equipment in the first year by generating your own gas. Fully acquainted with the needs of the food packaging industry, Gas Atmospheres will design a complete, packaged layout tailored to exactly suit your job requirement. Why not talk modern packaging and the application of inert or nitrogen gas with a Gas Atmospheres engineer. There's no obligation. Simply let us hear from you.

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equipment for producing industrial gases

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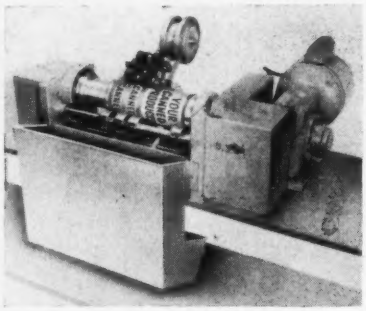

Portable Unit Bands Cans End-to-End

This compact, portable machine automatically bands cans, end-to-end, to be moved in combination deals.

Called the "Canbander", it is made in several models to accommodate two or more cans of any shape or dimension. Ordinary commercial pressure-sensitive tape—plain or imprinted—is utilized. Only one operator is needed to feed machine.—*Dellenbarger Machine Co., Inc.*, 379 W. Broadway, New York City 12.

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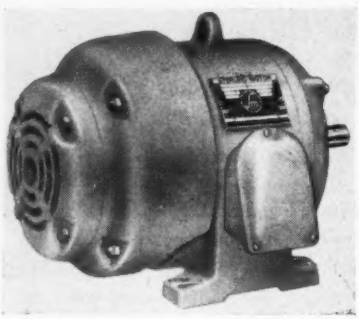
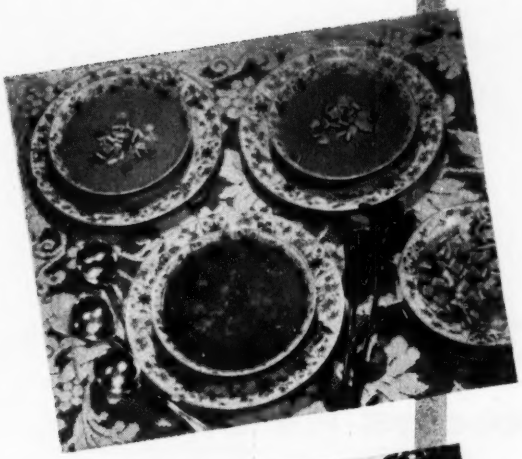


Totally Enclosed Motors Fit in Minimum Space

Advanced-design, totally-enclosed, fan-cooled, constant normal speed motors in frame sizes 182 and 184 have been placed in production. Streamlined, more compact design is a feature of these small motors, which comply with new NEMA approved standards.

Design improvement reported for new motors include: Elimination of over 50% of inactive space of previous designs, larger bearings per hp. ratings, with bearings double-shielded and pre-lubricated with extra grease reservoir; stator design providing more rigid windings and decreasing inactive copper and copper losses, and diagonal-cover type boxes that can be rotated 360 deg.



THEY'RE ONLY AS GOOD AS THEIR FLAVOR!

We can prove to any manufacturer of prepared food products the outstanding advantages of using our "CONTROLLED" SEASONING OILS and FLAVORS — greater uniformity, added flavorability and increased economy through easier, more efficient manufacture. The convenience and dependability of these materials — custom made to each manufacturer's precise needs — will appeal to every manufacturer of top quality food and beverage products. For the goodness of *your* product, consult

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FRITZSCHE *Established* 1871 **Brothers, Inc.**

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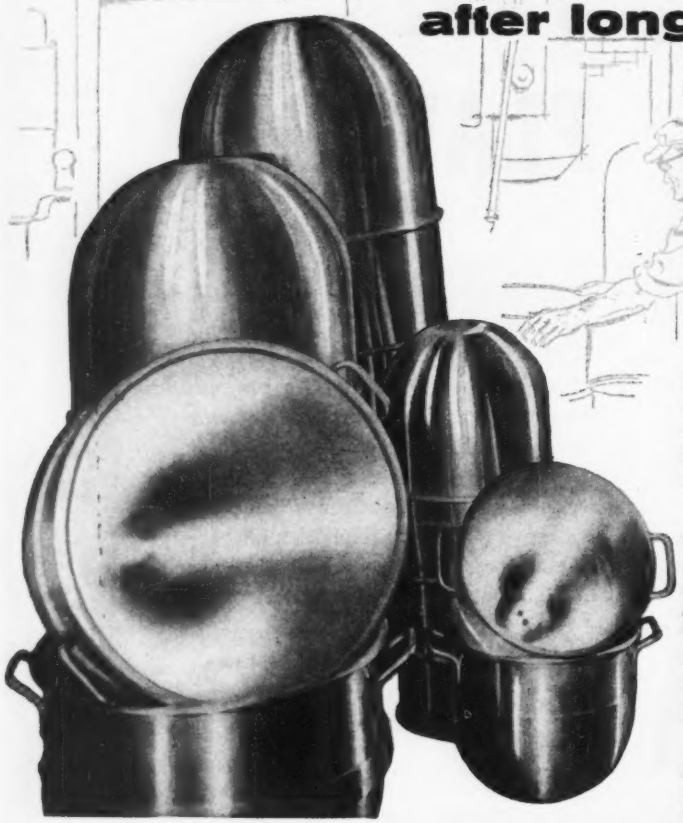
BRANCH OFFICES *and* *STOCKS: *Atlanta, Georgia, Boston, Massachusetts, *Chicago, Illinois, Cincinnati, Ohio, Cleveland, Ohio, *Los Angeles, California, Philadelphia, Pennsylvania, San Francisco, California, St. Louis, Missouri, *Toronto, Canada and *Mexico, D. F.* FACTORY: *Clifton, N. J.*

Mixing bowls made of Crucible stainless steel by American Car and Foundry Company, at its Milton, Pennsylvania plant.

CRUCIBLE STAINLESS STEEL keeps its shine after long, hard wear...



The fact is stainless steel improves with wear, for the more it is used the harder and smoother the surface becomes. And there is never any surface plating to wear on a stainless product, for stainless steel is *stainless* all the way through.

Yes, Rezistal® stainless is a *natural* for products that must take long hard service, or that must resist corrosion or wear, or stand up under daily cleaning with strong detergents. Take, for example, the stainless mixing bowls shown. They'll give many years of trouble-free service. And their smooth, sanitary surface makes them especially suited to the processing of baked goods, candy, cosmetics or chemicals.

Be sure you take advantage of all the money- and time-saving qualities of stainless steel. And be sure you specify Crucible stainless . . . made by the country's leading producer of special purpose steels. You'll get fast delivery of the grade and size you need when you call Crucible.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

STAINLESS STEELS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

Frame sizes 182 and 184 are now available with all others scheduled to be in production by 1955.—*Sterling Electric Motors, Inc., 5401 Telegraph Road, Los Angeles 22.*

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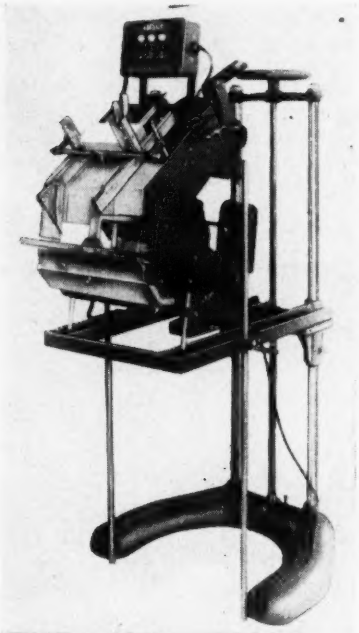

Bag Sealer Adjustable To Conveyor Systems

This new high speed, automatic bag sealer can be quickly and easily set up alongside existing conveyor systems. It features an adjustable floor stand which minimizes installation needs.

Operated by a hand crank, unit can be raised or lowered to suit bags of different heights when conveyor-fed. Labelling and sealing are done in a single simple operation. Sealing throughout width of bag is guaranteed by a highly sensitive adjustable dial-type thermostat which automatically controls the heat. Heating element, cartridge-type and hermetically sealed, is set within two crimp-sealing jaws.

Standard dimensions are 1½ in. wide by 12 in. long, with other size sealing surfaces available on request. Other features include: Positive pick-off and positioning of single label with each machine cycle. Ready adjustability for handling different sized lables. Simple, rapid stacking of the label hopper. Automatic folding to give equal or varied height (front of back) label faces.—*Amsco Packaging Machinery, Inc., Long Island City 1, N. Y.*

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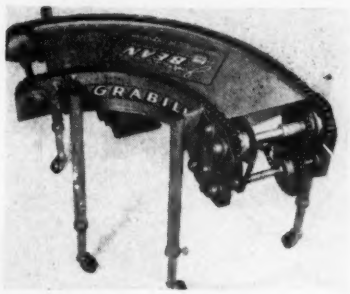

Power Conveyor Unit For Corner Handling

Smooth movement of boxes, baskets and/or cartons around corners is provided by a new 90 deg. power conveyor curve.

Compact unit can be used in conjunction with chain, belt or gravity system and handles loads up to 150 lb. Required line space is 22 in. Side guards are unnecessary on unit, which is adaptable to changing needs. Right and left hand operation is attained by reversing motor leads.

Curve is available in two models, 90-MD and 90-DE. Former, with motor, has legs that adjust from 20 to 36 in. in height. Latter, without motor, has fixed legs, made to height specified by customer. Both models have rigid, welded construction and ball bearings throughout. Finish is silver gray enamel. Units are available for immediate shipment.—*John Bean Div., Food Machinery and Chemical Corp., Lansing, Mich.*

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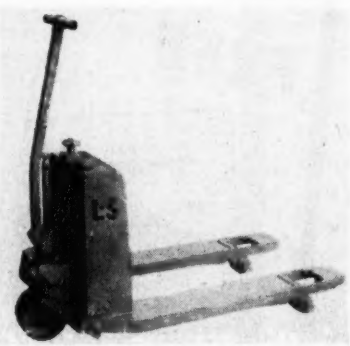

Low-Lift Truck Handles Pallets and Skids

Single-face, double-face pallets and skid platforms can be handled easily and efficiently with a new hydraulic pallet truck.

New model is designed to carry 2,000 lb. loads with a minimum of dead weight. With forks 48 in. long

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New truck is made in 6 fork lengths, from 32 to 60 in. and in 6 widths, from 18 to 30 in. It is equipped with rubber-tired front wheels and aluminum rear wheels.—*Lewis-Shepard Products, Inc., Watertown, Mass.*

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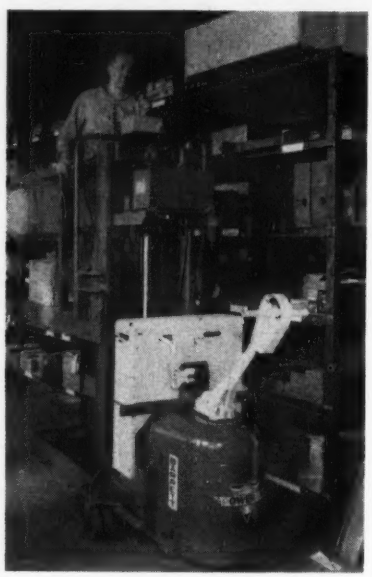

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On this high lift "walkie" type electrical truck, travel, steer and lift controls are mounted in a control box on the platform. Development speeds selection and removal of stock from racks or shelves. Operator stays on truck platform during a stock picking job making it a one-man task.

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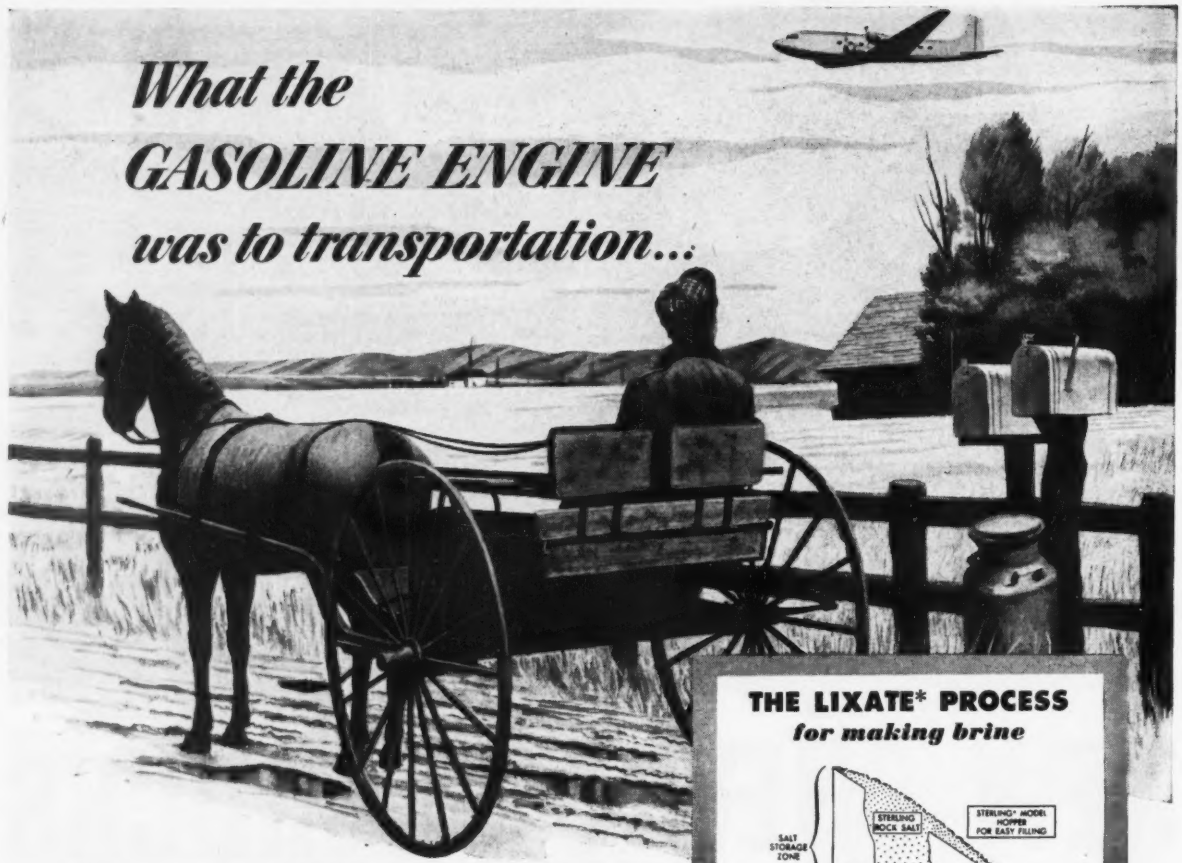

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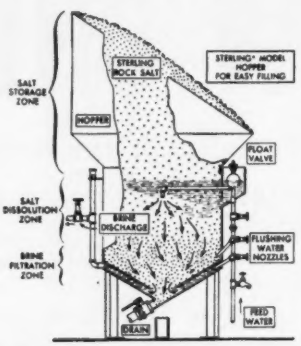

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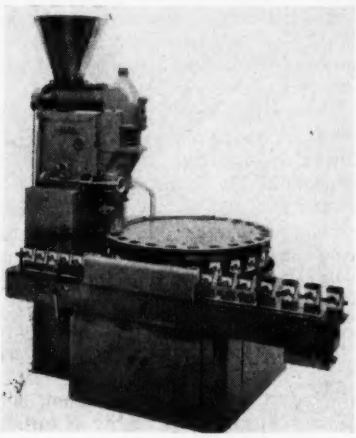

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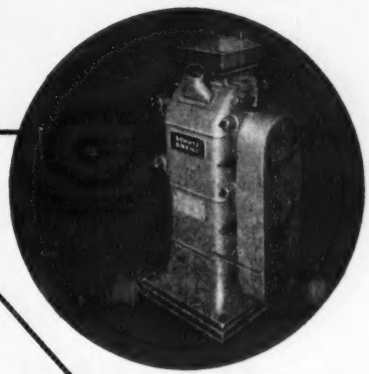

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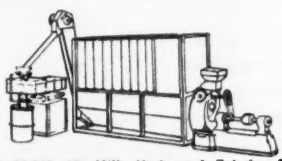
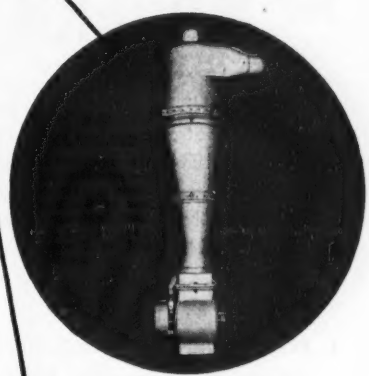
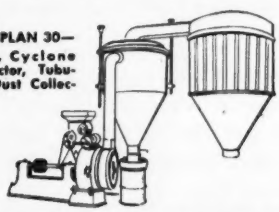
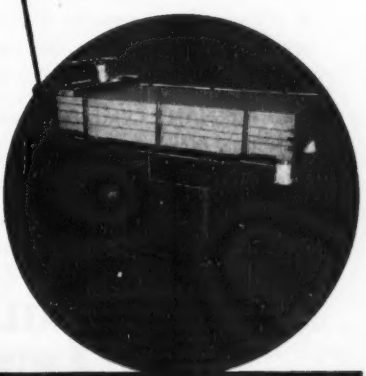


MILL PLAN 45—Mill, Horizontal Tubular Dust Collector, Elevator, Gyrator Sifter.



MILL PLAN 30—Mill, Cyclone Collector, Tubular Dust Collector.





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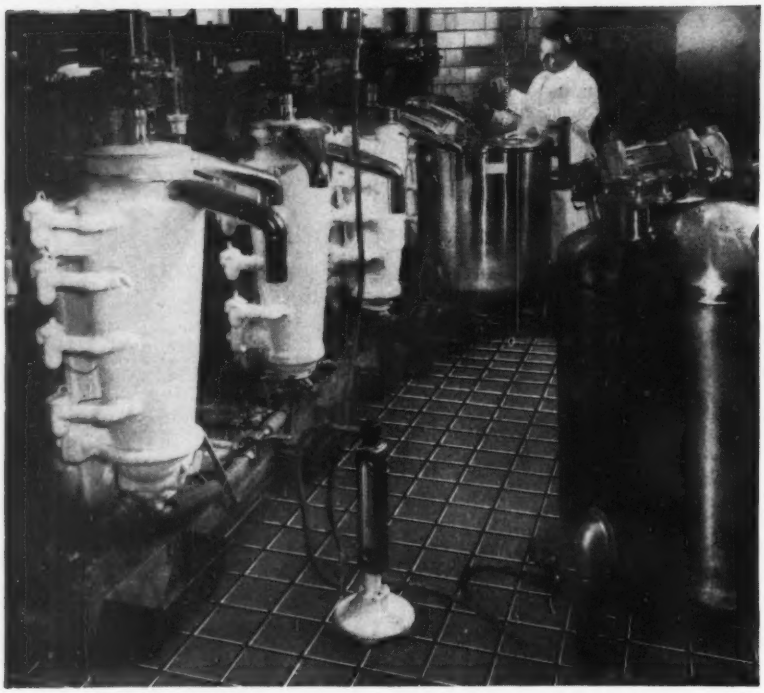

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New Industrial Detergent Rapidly Emulsifies Oils

Of interest to meat packers, meat and fatty oils processors is a new industrial detergent called Planisol. It rapidly emulsifies all types of oil and leaves a chemically clean surface.

Material is highly alkaline but contains no caustic soda or potash and can be safely and easily handled by plant personnel. It is nontoxic, will not burn the skin, and is non-inflammable.

It is a general purpose detergent, and may be used for a wide range of jobs—from cleaning large vessels heavily encrusted with polymerized oil to sanitizing food processing equipment. Material has excellent bactericidal properties.

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Vessels and equipment cleaned with new detergent are completely deodorized. Tanks that have been employed in crude oil service, for example, may be used immediately for storing or transporting finished oils, without fear of contamination.

Material maintains its efficiency over a long cleaning period, and may be used over and over again. Product, a white granular powder, is packaged in 400 lb. non-returnable fiber drums. —*Girdler Co., 224 E. Broadway, Louisville 1, Ky.*

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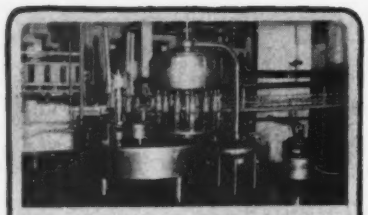

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Vacuum Mixing

—Continued from page 93

pheric product. Color was determined both by chemical means (measurement of the carotenoid pigments) and also visual tests (gaging the reflected light with a disk colorimeter).

Here are the scores in yellow percentage, brown percentage, and ppm. of carotenoid pigments: For the atmospheric spaghetti 13, 16, and 2.18, respectively; for the vacuum product, 18, 16, and 2.81, respectively.

These color tests indicated that the vacuum system reduces the amount of oxidation of color during processing, and thereby yields a finished product with a better retention of color. The figures reveal that vacuum processing produced a spaghetti with 29% more carotenoid pigment.

Another experiment was undertaken to ascertain changes taking place during the cooking process. It was thought advisable to determine the percentage increase in weight and volume after cooking, and also the dissolved solids in the water used in cooking. Preliminary experiments were made to establish the cooking time of each sample. It was determined by various analyses that cooking time for the non-vacuumed spaghetti should be 12 min., and for the vacuum product, 14 min.

Cooking Described

These products were cooked in accordance with the following standard procedure: Spaghetti, 18 oz., was placed in 2 qt. of boiling tap water containing 1% salt. Then it was boiled briskly for the stipulated time, counting from the moment the macaroni was dropped into the water. At the end of the cooking period, the spaghetti was drained through a colander.

Experiments showed that by maintaining the cooking time for the non-vacuum spaghetti at 12 min., and vacuumed product 14 min., the resulting products had the same degree of tenderness. The cooked products were examined very carefully and the following three determinations were made: Percentage weight increase; percentage volume increase, and percentage of residue (dissolved solids in the cooking water, indicating degree of disintegration).

Three cooking tests were run and the following averages recorded: For the atmospheric product, 168.7, 203.3, and 6.14, respectively. For the vacuum spaghetti: 170.9, 211.4, and 5.58, respectively. These results show that the vacuum type reduced by 10% the amount of residue, and the volume and weight of the cooked spaghetti increased slightly.

Feeding Is Continuous

Here is how the mixer-extruder unit works:

Mixing of macaroni and spaghetti components is accomplished in a continuous operation in which the ingredients are fed at a predetermined rate. Semolina discharges from a feed hopper through an adjustable slide gate onto a continuous belt conveyor. Running at a fixed speed, this belt delivers the flour to the head of the mixer in a continuous flow.

All parts of the mixer coming in contact with the product are made of stainless steel. Further, all contact parts are machined and designed so there are no unsanitary edges.

Water feeds continuously through a small pipe having a series of nipples over the width of the mixer at the head end. Supply is from a surge tank equipped with a float valve that maintains a uniform head on the line. Flow of water to the nipples is regulated by a plunger-type plug valve.

The mixer has a horizontal cast-steel housing and U-shaped trough. It is rectangular in plan. There are two parallel shafts equipped with blades. Driven from a common gear, the shafts rotating in opposite directions. Faces of successive blades oppose each other in material movement, but thre thrust forward exceeds that of the return blade. Thus an oscillating movement results, with a gradual forward travel of the material. Since the shafts travel in opposite directions there also is a cross movement of material. This aids in the mixing.

Dough passes from the mixer through an adjustable slide gate to a screw press, which supplies the necessary kneading action. An ammeter connected to the motor driving the screw press indicates the load on the screw. Stiffness of the dough is measured in this manner. If the dough is too dry or too wet, corrections are then made in the feed of the flour or water as needed.

To apply vacuum, here is what has been added: There is a new cover constructed in two parts. Each part is made of aluminum framing, with Plexiglas between the frames. Thus mixing operations are plainly visible to the operator. Underside of the cover frame has a Neoprene bearing liner along the edge to provide an airtight seal on contact with the mixer bowl frame proper. Weight of the atmosphere holds the cover down tight, with vacuum pulled from inside the bowl.

Next, a divider plate, at right angles

to the mixing shafts has been inserted, cutting the mixing section in two. This plate extends down to a level just above the mixing shafts. Purpose of the divider is to prevent dust or small flour particles from being drawn directly into the vacuum line.

Vacuum is pulled from an opening at the upper corner of the discharge end of the mixer bowl. Therefore, any light flour particles entering the mixer must come in contact with the moistened mass before reaching the section of the mixer containing the vacuum line. Mixing in the vacuum minimizes the amount of oxygen present during the operation and, as shown in the test mentioned earlier, greater carotene content is retained in the finished product.

Further, the amount of entrapped air in the mixture is reduced to a minimum before it enters the press. And so when material leaves the extruder, the amount of air released has been minimized (air tends to produce an uneven or ragged edge on the outer surface of the finished product) and an improved, smoother product results.

Vacuum equipment selected is particularly suitable here. For any combination of dust and lubricant is highly undesirable. Unit employed is a 3-hp. Nash Hyster vacuum pump. It has no internal wearing parts and requires no internal lubrication, it is compact and is easy to maintain.

This unit consists of a single moving element: a round, multi-blade rotor turning freely in an elliptical casing partially filled with liquid. In this instance, the water used is obtained from the waterjacket on the extruder cylinder. From the pump it is released to sewer.

The curved rotor blades project radially from the hub. With side shrouds they form a series of pockets or buckets around the periphery. Speed of the rotor is high enough to throw the liquid out from the center by centrifugal force into a solid ring of liquid revolving in the casing. Traveling at the same speed as the rotor, the liquid follows the elliptical shape of the casing.

This contour alternately forces the liquid to enter and recede from the buckets in the rotor at high velocity. At the wide part of the ellipse the water recedes, permitting the buckets to fill with air from the stationary inlet ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the air and delivering it through the fixed outlet ports.

With this type of unit, any possible leakage of dust or flour particles from the mixing chamber to the vacuum unit would have no effect.

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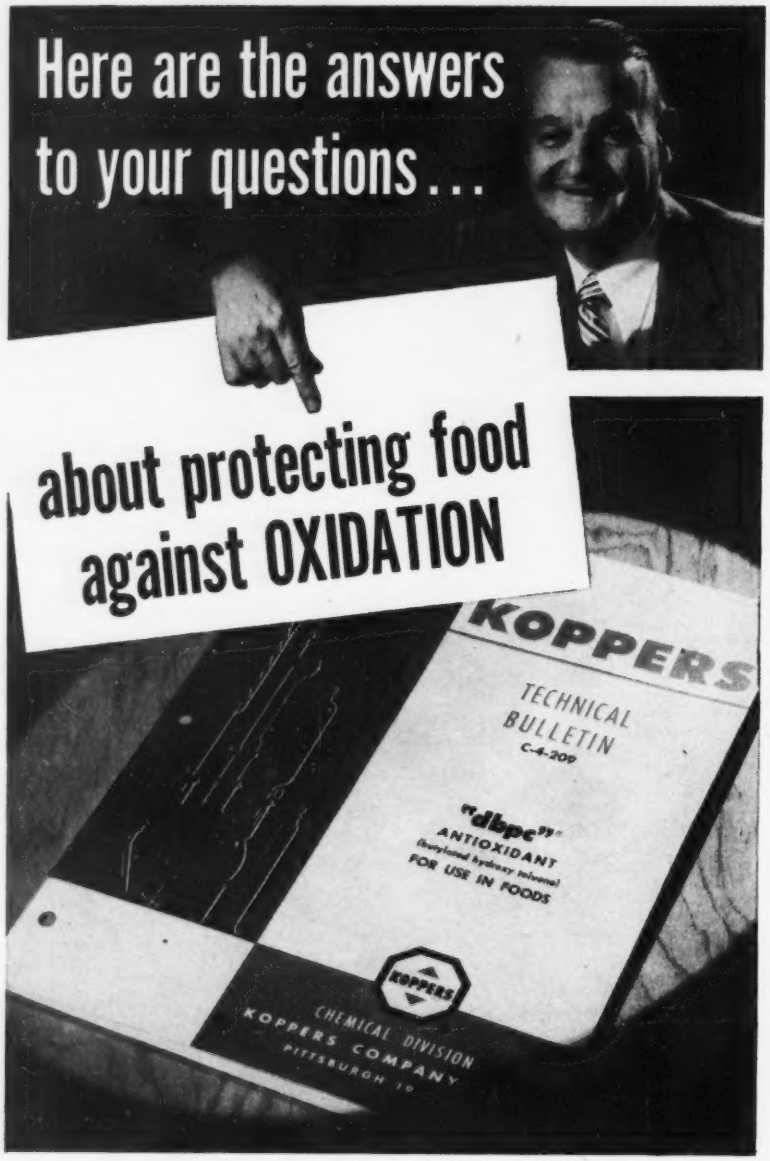

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A vacuum of approximately 23 in. is maintained during the mixing operation. The vacuum pump is installed directly beneath the operator's platform and requires no more floor space than previously used.

End (Resume reading on page 94)

Automatic Palletizing

—*Continued from page 78*

tons has been formed, a ram moves forward and pushes the row of cartons on to a stripper plate. The ram retracts and additional rows are formed until a full layer of cartons is accumulated on the plate. This plate retracts from under the layer, and the cartons drop down approximately 1 in. onto the waiting pallet.

Then the pallet and its first layer of cartons is dropped down far enough to allow the stripper plate to return to its original position and begin to accumulate another layer of cartons.

To provide the interlock, this next layer will be a different pattern from the preceding layer. As soon as this interlocking layer is completed, the stripper once again retracts and the second layer of cartons drops on to the pallet. Now, the latter again descends, a third layer is formed and dropped, and the cycle continues until the pallet is fully loaded.

The completed pallet is discharged from the machine onto a section of conveyor, from where it subsequently goes to storage or to shipping. As soon as the unit-load is clear of the machine, an empty pallet moves into place under the stripper plate. Empties are fed automatically from a magazine, which is replenished at intervals by a fork-truck operator.

Loaded pallets may be picked up by a fork-truck at the end of the short conveyor leading from the loader, or they may be handled by a fully automatic system.

In one such system now being installed in a Philadelphia brewery, the discharged pallets will travel by conveyor onto a vertical lift that will take them to another floor for storage. There they will be automatically ejected from the lift onto powered accumulating conveyors on the storage floor, where they are picked up and stacked.

Throughout this entire operation the pallet loader operates without attention. All that's necessary is to push the start button. From then on the loader handles the entire operation—except for pallet replenishment. A series of pilot lights on the loader control panel indicates each step in the loading cycle as it occurs.

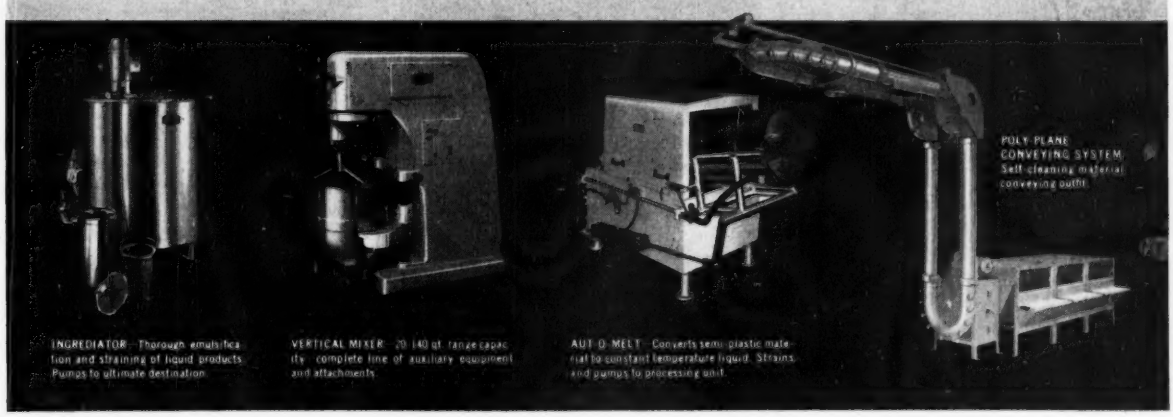
End (Resume reading on page 79)

PRIMITIVE METHODS HAMPER MODERN TECHNIQUES

Using primitive materials handling methods to keep pace with modern production schedules creates problems as well as unnecessary expense. In recent years, many food processors have overcome troublesome, costly materials handling problems through application of equipment once considered strictly for bakery use. This equipment, manufactured by the Read Standard Corporation, has met with increasing acceptance and application throughout the food processing industry.

READ STANDARD CORPORATION

BAKERY-CHEMICAL DIVISION • YORK, PENNA. • LOS ANGELES 39, CALIF.



INGREDIATOR—Thorough emulsification and straining of liquid products. Pumps to ultimate destination.

VERTICAL MIXER—20-140 qt. range capacity; complete line of auxiliary equipment and attachments.

AUT-O-MELT—Converts semi-plastic material to constant temperature liquid. Strains and pumps to processing unit.

POLY-PLANE CONVEYING SYSTEM. Self-cleaning material conveying outfit.

NEW PACKAGES & PRODUCTS

More Instant Milk

Borden's has joined the "instant milk" trend with the marketing of Instant Starlac. A soluble non-fat dry milk, the product is an improvement of the company's earlier Starlac.

Reported as the first non-fat dry milk in national circulation, Instant Starlac does not cake or lump, and mixes readily – even with ice water. Having a low moisture content and coming in a foil-lined package, the product has high shelf life.

The new product is packaged in two sizes: A blue economy-size Starlac 1-lb. package making 5 qts. of milk, and a red pre-measured 3-qt. package. The latter is especially convenient since it contains three individual envelopes, each containing enough dry milk for one quart of liquid milk.

'Poly' Coated Wrap

Butter wrappers coated with wax containing Bakelite polyethylene resins add eye appeal to the dairy product. Developed by National Butter Co., St. Paul, Minn. and Rap-in-Wax Paper Co., Minneapolis, the wrap helps preserve the butter, and resists loss of moisture that might cut down net weight.

Flexible at low temperatures and inert to most chemicals and acids, the polyethylene resins fortify the wrapper coating against handling. Smooth and glossy, the transluscent coating makes printing colors stand out. The new wrap may be used on standard butter packaging equipment.

Circle 170A on Reader Service Card

Better Packaging for Prepared Meats Is Trend at Latest AMI Exhibition

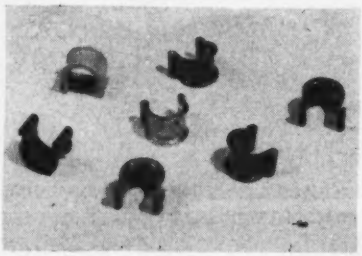
A trend toward better looking prepared-meat packages was evident at the annual American Meat Institute Exposition at Chicago last month. Improvements in casing materials for sausages, and meats of the liverwurst types was mirrored at some booths, with others placing emphasis on speedier and more mechanized packaging.

Skinless sausage lings are automatically formed eight at a time and ejected from a molding machine onto window-type cartons. The molding machine, made by Basic Food Materials, Inc., was hooked up to a sausage stuffing machine.

Sutherland Paper Co. debuted a new "Purity-Pak" twice the size of standard frankfurter cartons. Made on machinery manufactured by Battle Creek Packaging Machines, Inc., the cartons offer full visibility of product, maximum display, and a neat, squared off package.

Unusual was the idea of W. C. Popper & Co. to include one of their comic books as a backing for weiner packages. The books, 3¾ by 4¾, offer an entrancing premium for small fry, as well as providing a sturdy backing.

Visking Corp. displayed a new moistureproof fibrous casing for liver sausage and braunschweiger. The casing does not shatter when sliced, and prevents drying or discoloration of product. Another new casing, of fiber coated with epoxy resin, shown by Transparent Package Co.



COLORED CLIPS for casings made by Vac-Tie Fasteners, Inc.

Soli-Tite machine and fasteners were exhibited by Vac-Tie Fasteners, Inc. Used for compressing boneless meats in fibrous casings, the machine is claimed to offer 40% operating savings. Fasteners are fed directly into the machine.

The clips used to seal the ends of the package are horse-shoe shaped, lipped to provide extra strength. They are available in various colors, for better package appeal.

Circle 170B, 170C, 170D, 170E, 170F, 170G, 170H on Reader Service Card

Musical Carton, Pie Crust Stick Added by GMI

A cereal carton that includes a "cut out and play" record and homogenized pie crust mix in stick form were unveiled by General Mills recently.

The record is acetate film and is glued to the front of the Wheaties carton. The purchaser need only cut the record from the carton and play it on any standard record player. Of the 78 r.p.m. type, the record is 5¼ inches in diameter. Titles include "Pony Boy," "Yankee Doodle," and others.

The pie crust mix in the form of homogenized sticks was test-marketed by General Mills last September and proved successful. Contains more shortening than standard pie mixes, the sticks come closer to the "home-cooked" standard. Each 9-oz. package contains two sticks of mix separately wrapped in parchment paper. Each stick makes one crust.

The crust mix is marketed under the Betty Crocker label.

PROTECTED by Riegel

BONOMO "BITE SIZE" TURKISH TAFFY USES A RIEGEL INNER WRAP . . . A LAMINATION OF FOIL AND COATED POUCH PAPER SPECIALLY DEVELOPED TO PEEL QUICKLY AND CLEANLY FROM THE CANDY.

More than 600 Riegel Papers are now proving their value for many of the nation's best-selling brands. It is the greatest variety of packaging papers available from any one source.

Somewhere among this wide selection you may find a better or more economical paper to protect your product. If we don't have just what you want, we can usually "tailor-make" a new paper to your specifications.

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For more information, use coupon on last page.

AN EXPLANATION

In answer to increased interest in a recently inaugurated procedure for conducting "on-the-spot" demonstrations of air-flotation equipment, we are pleased to make the following explanation.

The advent of our lab-size Whippet V-80 Separator makes it possible to establish, in your own plant and at your convenience, accurate forecasts of results which will be obtained from the identical process under full-scale operating conditions.

Such a demonstration may be of invaluable aid to that phase of your research program which involves the economy of operations and the quality of raw or end products. Perhaps the V-80 will indicate an immediate usefulness. Seeing is believing.

Your move is simple. Write to the department and address below. Tell us that you want to see the results of separations made by effecting differences in specific gravity through air-flotation . . . under *your* actual operating conditions, rather than in a catalog. We'll take it from there.

Dept. F-1154

SUTTON, STEELE & STEELE, INC.
1031 SOUTH HASKELL, DALLAS, TEXAS

Gourmet Specialties

Chicken paprika, veal goulash, steak Stroganoff, and other dishes that appeal to the gourmet, are the specialty of Imre Sandor, New York City processor.

A former recipe advisor in large food plants, Mr. Sandor restricts output of his line of canned foods, placing emphasis on quality. The foods are cooked before packing, requiring only heating by the consumer.

In addition to the products mentioned above, this small processor packs Hungarian beef goulash, ragout of veal, stuffed peppers, sholet, lentils, and a line of desserts. In the luxury class, the canned meals are directed at batchelor households.

The chicken paprika and stuffed peppers are packed in 20-oz. cans, the rest of the specialties in 15-oz. sizes. Labels are in two parts, a band of heavy brown, green and red paper with a gamebird motif, and a cream colored paste-on label with brand identification.

Micro-Ground Spices

Combining the advantages of both ground and soluble spices are the micro-ground seasonings recently marketed by W. J. Stange Co., Chicago. Processed under the 50-A label (chosen to commemorate the company's 50th anniversary), the spices are ground 20 times smaller than the standard 60-mesh spice. This gives the product 20 to 100 times more particles permeating the batch, transferring the flavor to food in much the same time needed for soluble seasoning.

The spices retain true color and flavor during the high processing temperatures. Ground in a specially adapted roller mill, the seasonings are standardized for flavor and for appearance.

Can Clamp Marketed

Fast and simple multiple unit packs are possible with a unique clamp manufactured by Packette Corp., Milwaukee. Two of the clamps are used for each joint, and it is possible to join cans in compact units of four or more.

The clamps are readily removed with a standard can opener. They are made to fit cans ranging from 6 to 20 ounces.

Circle 172A On Reader Service Card

New-Design Flavor Bottle

A new molded bottle design has been introduced by Canada Dry Beverages for packaging of small-size flavors. The 8-oz. bottle was designed by Raymond Loewy Associates as the bottling company's first departure from conventional bottles.

Almost as high as Canada Dry's standard 12-oz. bottle, the new design offers high eye appeal. The lower half is tapered to the waist and surfaced with a raised waffle grid for easy handling. The upper half rounds out, tapers to the top. The only label is the familiar red, white, and green trademark.

A handy carton was also designed to accommodate the new bottles. The carton carries out the color and trademark theme.

Holiday Cheer

Of particular interest to dairymen is the recent marketing of McCarthy Egg Nog Mix, by the McCarthy Fruit Products Co., Evanston, Ill. The mix is directed at the growing popularity of the holiday drink and will allow dairymen to channel part of their milk into this ready market.

Made of whole egg yolk solids, sugar, and nutmeg, the liquid mix is packaged in No. 10 cans. A special promotional kit including window streamers, and other sales aids is being offered to dairymen with the mix.

Circle 173A on Reader Service Card

ANOTHER H&D FIRST

A New Look IN CORRUGATED BOXES!

Here's a **new** corrugated board with a **new** uniformly brighter color and a **new** smoother-than-ever finish

As another in a long list of "firsts," Hinde & Dauch has produced CORABRITE—an entirely new corrugated board. Over the years, H & D has developed strong, durable boxes to meet an incredible number of packaging needs. Now, to this strength and durability, H & D has added a vastly improved surface.

This lighter, smoother, stronger finish, which will be standard on all Hinde & Dauch regular shipping boxes, is the product of progressive paper chemistry at the laboratories of West Virginia Pulp and Paper Company.

CORABRITE offers a far better printing surface, thus enhancing the advertising value of your shipping boxes. Your boxes will have a more uniform appearance, too—CORABRITE eliminates 80% of the color variation found in natural finish kraft.

Don't wait. Write or call your H & D representative—ask about CORABRITE.

Corabrite

For more information, use coupon on last page.

Using Woven Wire Conveyor Belts?

get to know your Cambridge man!

Every Cambridge Sales Engineer—both in the field and the home office—is thoroughly trained in every phase of wire belt engineering.

That means he's equipped to give you *complete, accurate* advice and recommendations—based on our years of leading the development and applications of woven wire conveyor belts. You can be sure that the belt he recommends for you will give top performance, because every Cambridge belt is selected and fabricated to meet individual requirements. No two belts are alike. The belt you buy is designed for you alone.

Moreover, every step of belt fabrication at the plant is closely inspected to make sure the finished belt meets rigid specifications for size, mesh count and mesh opening.

So, for complete satisfaction with belt performance—get to know your Cambridge man. He's listed under "Belting-Mechanical" in your classified phone book—or write us direct.

IF YOU'RE NOT USING WIRE BELTS let us tell you how they can boost production and cut costs by combining movement with processing. No obligation, of course.

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Gives complete specifications for Cambridge wire belts, provides you with background knowledge for discussion with your Cambridge Sales Engineer.

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WIRE CLOTH — METAL CONVEYOR BELTS — SPECIAL METAL FABRICATIONS

OFFICES IN LEADING INDUSTRIAL AREAS

Revolving Label For Can

A novel and highly attractive labeling idea is being used by Lever Brothers Co. for its recently introduced cream sauce mix. Involving the use of two labels—one fixed and one revolving—on a paperboard container, the package is the result of a highly accurate and tricky labeling performance.

An inner label, secured to the container, holds printed recipes and illustrations of the dishes that may be prepared with the product. The outer label, turning freely, has brand identification and two windows—one on the face of the label, the other on the side. As the label is turned so that an illustration of the prepared dish appears at the window on the front, the appropriate recipe is shown simultaneously at the side window.

Currently, the product is being test marketed in Florida, Indiana, New York and Wisconsin. Packed in an 8-oz. metal-ended paperboard container with a wide-mouthed lid, the product may be used to make cream sauces of varying consistency, cheese or tomato sauces, or a smooth pan gravy. Powdery in appearance, the mix does not have to be refrigerated. Each container will make 8 cups of gravy.

The Good Luck trademark, a four leaf clover, appears prominently on the label, which is lithographed in green, yellow, and orange.

New Evaporated Milk

Foremost Dairies, Inc., has announced that they will soon market a canned evaporated milk that has the appearance and aroma of fresh Homogenized milk. Mixed with equal parts of water, it is said to taste similar to whole milk.

Indications are that people will use the new canned milk for purposes new to evaporated milk. It can be used on cereals, for example, and will whip into an ideal topping for desserts.

Innovation in processing is the time and method of sterilization. The method used by Foremost is similar to that used in pasteurization of fresh milk. Canning is done by Martin Asceptic System manufactured by Dole Engineering Co.

Peppery Cheese Link

Reported as the first of its kind, a pepper-flavored cheese link is being marketed in the Southwest by Kraft Foods Co. Called Kraft Pepper Jalapeno, the cheese is packed in the familiar "Handi-Snack" 6-oz. process cheese link.

The red, yellow and black label is printed on foil in both Spanish and English.

The product is the result of extensive research and experimentation by Kraft, including the touring of Mexican canneries specializing in pepper and spice processing.

Another Canned Pie

Trenton Foods, Inc., Kansas City, Mo,. has introduced the third product in its unique line of canned, ready to bake and eat canned pies. Made from a traditional holiday recipe, the canned mince pie is packaged in the same pie-pan can used for the processor's chicken and beef pot pies.

Like the other two, the new product requires no refrigeration and is ready to bake in its container once the

lid is removed. Twenty-five minutes in the oven is enough to bring the pie to the dinner table.

The pie is marketed under the Dinner Time label.

Grooved Mustard Jar

Designed and manufactured by Pad-L-Jar, Chicago, a grooved jar is being used by H. C. Bohack Co., Inc., Long Island, for its line of Island Manor mustard. The groove, $\frac{7}{8}$ in. long, is covered by the label and holds a wooden paddle for applying the mustard. The groove does not extend to the bottom of the jar face, a $\frac{1}{8}$ in. step preventing the paddle from sliding out.

New Product Shorts

Durable Plastic Film

Production of Mylar polyester film has begun at duPont Co.'s Circleville, O., plant. Film has high tensile strength and will withstand high temperatures. Only reported use is as drum liner.

Breakfast in a Hurry

Addition of half a cup of boiling water and some salt to H-O Instant Oatmeal will present a hot breakfast in a matter of seconds. The new product is marketed in 1-lb. boxes.

More Variety for Baby

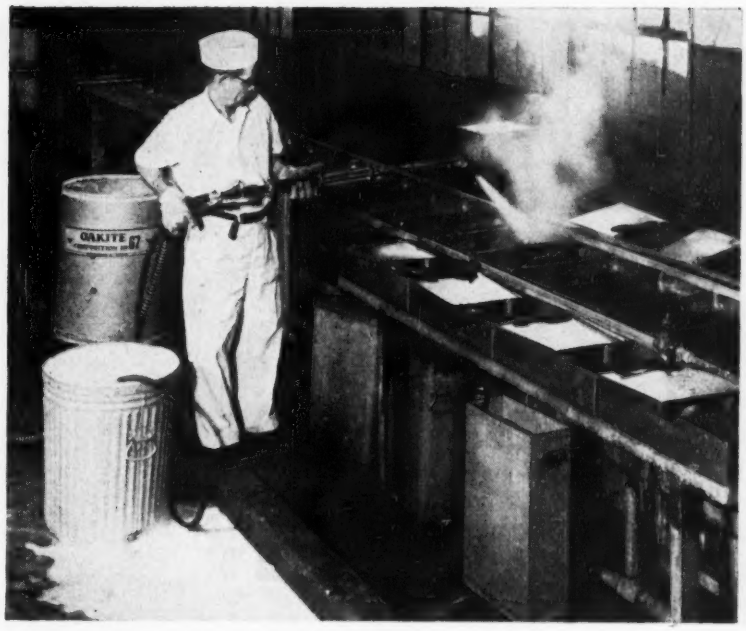
Gerber's Baby Foods is introducing strained garden vegetables and strained chicken into their line of canned foods.

Toppings Go Retail

Chocolate, pineapple, butterscotch, and strawberry toppings for ice cream are being retailed in 5¾-oz. cans by Richardson Corp., Rochester, N. Y. The toppings were formerly available only in institutional size packages.

Exploded Corn Meal Product

Maize Industries, Chicago, has introduced a line of snack and confectionary products made by exploding corn meal. The corn is flavored with cheddar cheese, chocolate, caramel, and peanut butter.



Steam-clean eviscerating tables twice as fast with half the work

Whoever heard of cleaning eviscerating tables without brushes or chore-boys . . . without elbow grease . . . without climbing over and crawling under equipment?

This man has. He's doing it—with twice the speed and less than half the work—thanks to the Oakite Steam-Detergent Gun in his hands.

This gun gives the old one-two to tough cleaning jobs. Just turn the valve to clean—hot detergent solution blasts away, breaks up the soils . . . gets into every corner and crevice, on top or underneath. Turn the valve again to rinse—soil floats right off, equipment dries down fast, and *clean.*

All the equipment you need you see in the picture—the Gun, the Oakite detergent, the solution container, the hose leading to the plant's own steam supply.

There's no easier way to clean tables, packaging machines, elevators, conveyors, peelers, fillers, can sealers, walls, floors. Most workers like it because they get more work done in less time, with less effort. Your equipment likes it . . . no scouring means longer life.

FREE BOOKLET tells all about it, gives operating details and model specifications of this work, time, and money saver. Ask your Oakite Technical Service Representative for your copy, or write Oakite Products, Inc., 27A Rector Street, New York 6, N. Y.

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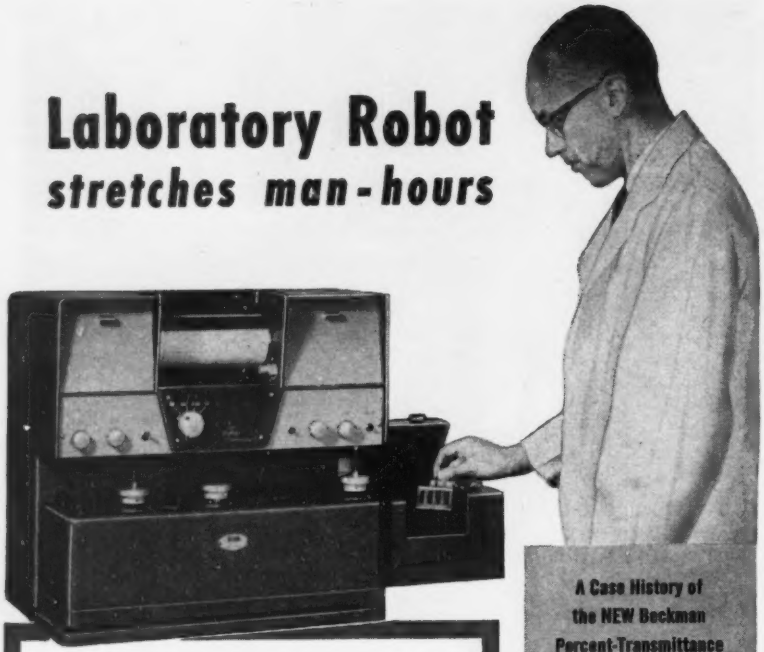
Technical Service Representatives Located in Principal Cities of United States and Canada

Laboratory Robot
stretches man-hours



A Case History of the NEW Beckman Percent-Transmittance Recording Spectrophotometer

"In five months, this robot spectrophotometer has saved us better than seven months of a skilled chemist's time."—
Roger W. Truesdail, Ph. D.

A leading independent laboratory, Truesdail Laboratories, Inc. of Los Angeles, has used a Beckman Model DR Recording Spectrophotometer in from 30 to 40 percent of all its testing and research work. Read what Dr. Truesdail and his staff have to say about this revolutionary, time-saving apparatus:

"...Where formerly we ran just a few points on a curve—possibly missing important data—we now obtain a full, neatly-printed spectrum on easy-to-file notebook paper...This instrument has put spectrochemical analysis on a mass production basis. In use five or six hours a day, its speed saves us more than the time of one chemist. The 'three sample' feature enables direct Beer's Law, pH, or other comparisons on the same chart...If anything, the accuracy of this robot instrument surpasses that of our most skilled manual operators."

Among its many assignments, the Beckman Recording Spectrophotometer is used at Truesdail Laboratories in the examination of alkaloids, synthetics, drugs in human and animal body fluids, foreign constituents in drugs, heavy metals in plastics, caffein in coffees, theobromine in cocoa, and scores of others.

For more information on this remarkable analytical robot, write for Data File 96-19

Beckman *division*
BECKMAN INSTRUMENTS, INC.
FULLERTON 1, CALIFORNIA

Deviled Crabs

—*Continued from page 99*

is transferred into a —30 deg. F. blast freezer, where it is flash-frozen in about 30 min.

The individual deviled crabs are kept separate in the freezing. This way, there is no chance of products sticking to one another and losing their breading. As a result, they reach the consumer uniform and eye-appealing.

6. Girls finally pack two 3-oz. deviled crabs in a laminated carton. Product-packed cartons are then belt-conveyed to a wrapping machine that applies a heat-sealable, waxed-paper overwrap. Cartons subsequently are packed into shipping cases for freezer-storing prior to shipment.

The Eat-All Frozen Food Co. also manufactures frozen deviled lobsters, deviled clams, salmon croquettes, chicken croquettes, breaded oysters, and a line of bite-size versions of the seafoods.

Most popular of the latter are the "Crabettes," which are bite-size deviled crabs.

End (*Resume reading on page 100*)

Rail-Riding Freezer

—*Continued from page 127*

eutectic plates are charged simultaneously. Fuel for the diesel engine is supplied from a bunker in a special bunker-and-tool car.

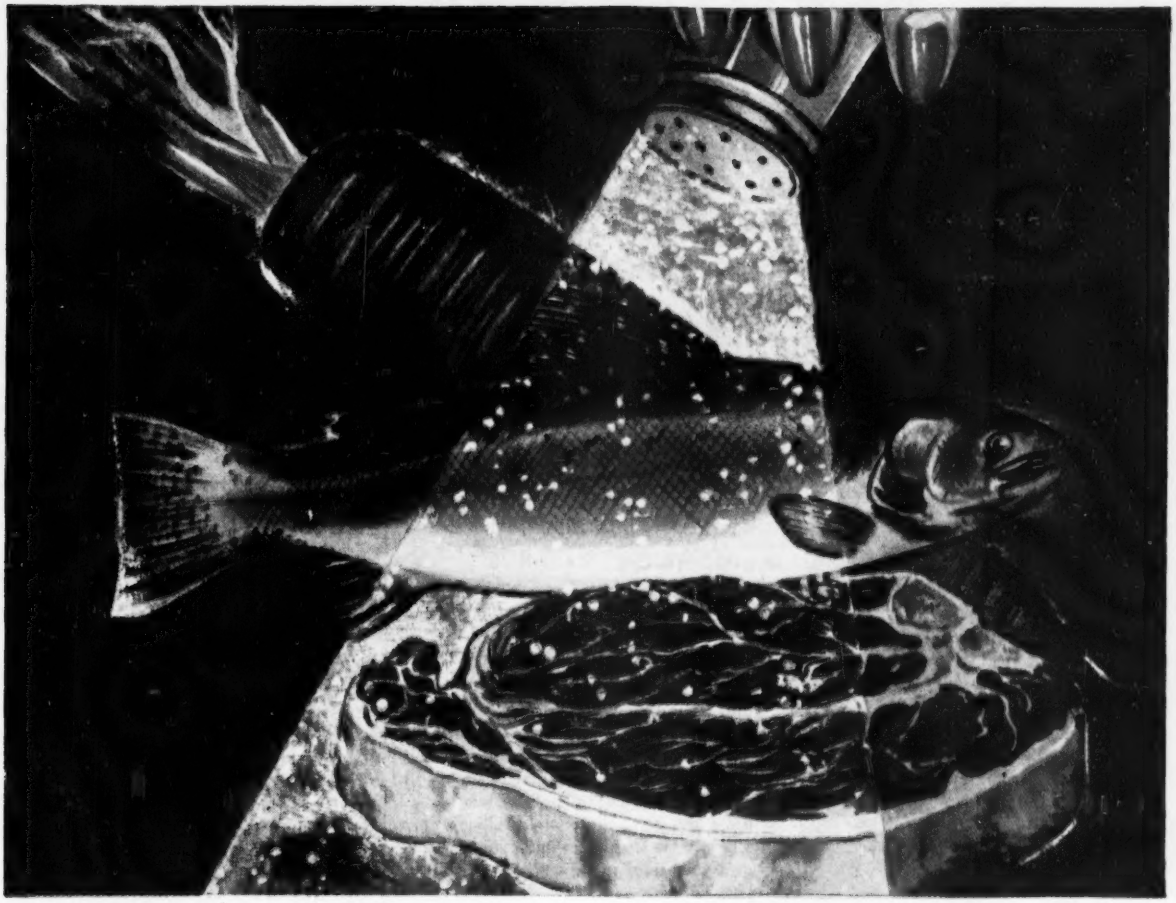
When the train arrives at one of the growing sites, a transport car is loaded with foods to be frozen and connected to the refrigerating car by a collapsible duct. Then a cold air blast is circulated through the fresh products and back to the refrigerating car via a ceiling duct. Thus, the transport car acts as an air-freezing tunnel, wherein food temperatures may be brought as low as —40 deg. F.

After the load is frozen, the transport car is simply disconnected and dispatched to a refrigerated warehouse. And enroute, the charged eutectic plates maintain a below-zero temperature in the car.

In the meantime, another transport car is loaded, frozen, and sent off. Then when the third car also is frozen and ready to go, the first one returns to take its place, and so on.

Finally, after this region's food is processed, the whole train moves on to the next area.

Starting with the first month of the year, a typical intinerary for the "Thermo Train" may be: Cod on the south coast, mackerel on the west coast, strawberries in the middle of



Magic Crystals

Now End Flavor Fading In Your Processed Foods

With Zest,® 99+% Pure Monosodium Glutamate, Food Processors Make Foods More Flavorful Than Ever!

AMERICA'S LEADING FOOD PROCESSORS USE THESE STALEY PRODUCTS

Staley's 99+% Pure Monosodium Glutamate — pure, free-flowing crystals that intensify natural food flavors.

Corn Syrup—Sweetose Brand-high conversion sweetener for firmer texture, better flavor.

Corn Oil—A vegetable oil of highest quality for cooking and food processing.

Lecithin—An established emulsifier and anti-oxidant for the Food Industry.

No need to let heat, pressure and other processing conditions rob food of taste appeal. Zest magnifies the natural flavors without adding any flavor, color or aroma of its own. Whether your products are frozen, dehydrated or canned, Zest brings out all their natural goodness—puts them first on the consumer's shopping list.

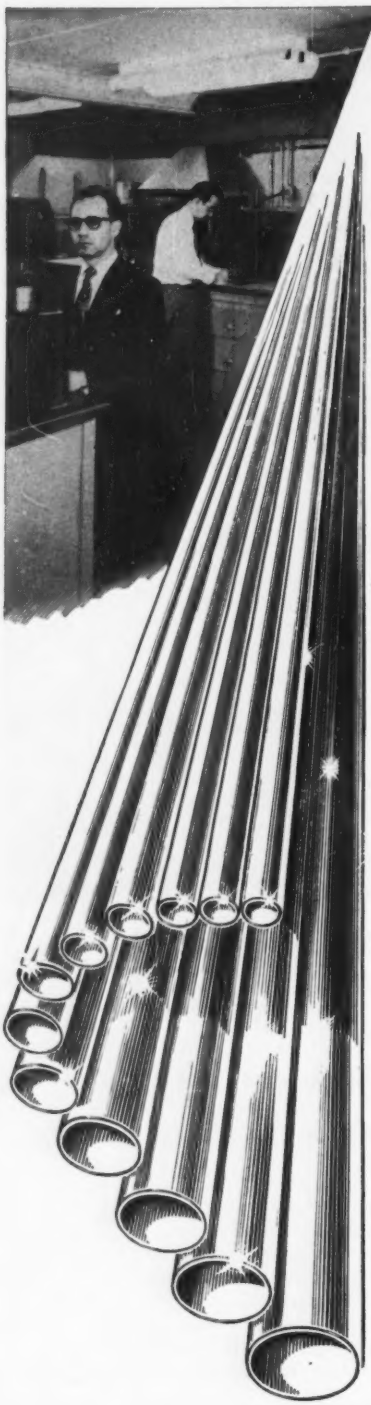
A. E. STALEY MFG. CO., *Decatur, Ill.*

PRODUCTS FROM CORN
Staley's

Industries Served by Staley Products

BAKING • CONFECTIONERY • ICE CREAM • FOOD PROCESSING

For more information, use coupon on last page.



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Quality Control

OF WELDED STAINLESS STEEL TUBES AND PIPE WILL PROTECT THE PURITY OF *YOUR* PRODUCT

- **in flow lines**
- **coolers**
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- **sanitary tubes**

From start to finish . . . rolling the strip . . . tube forming and welding . . . cold drawing . . . annealing and pickled or polished finishes . . . modern instrumentation provides a continuous quality control on Wallingford stainless tubes and pipe. That's why Wallingford tubing is the finest protection you can give your fluid food.

- ✓ **Smooth cold drawn finish, white pickle or polished.**
- ✓ **To any grit finish O.D., I.D. or both.**
- ✓ **Extremely resistant to corrosion and abrasion.**
- ✓ **Made in sanitary tubes . . . sizes and tolerances to Specification ASTM A-270-49.**
- ✓ **Furnished in Types 304, 316 or any approved analysis or specification.**

Where corrosion resistance, cleanliness, durability and prevention of product contamination are vital factors, specify Wallingford Stainless Tubes and Pipe, produced in a completely integrated mill, where quality control prevails from raw material to finished product.

WRITE TODAY FOR NEW BOOKLET . . . "WALLINGFORD QUALITY TUBING AND PIPE"

THE WALLINGFORD STEEL CO.

SINCE 1922

WALLINGFORD, CONNECTICUT, U. S. A.

STAINLESS • ALLOY • HIGH CARBON • LOW CARBON • STRIP • STAINLESS WELDED TUBES AND PIPE

the country, peas on the east side, strawberries farther north, and blueberries in the extreme north.

In the fish operations, the train can ride a spur directly out on the seawall, thus virtually coupling up with the fishing vessels.

Although the train's freezing and handling costs are somewhat higher than those of a stationary plant (when such is feasible), here the mobility of operation in a broadening market is well worth the difference.

Fast Growing Field

With its "Thermo Train" as a nucleus, Helsingborgs Fryshus AB organized for freezing, storage, and distribution of frozen foods by availing itself of American experience. The start was made by locating processing plants and a cold storage warehouse in Helsingborg, a strategic point for the collection of perishables from the southern provinces.

Now in service are three insulated trailer-trucks and three railroad cars for distribution from the central plant to depots ranging to a radius of 1,200 miles. Trucks are equipped with American "Thermo King" refrigerating units. Of the rail cars two have dry-ice bunkers with thermostatically controlled forced air circulation. And benefitting from the fact that the principal railroads of Sweden are electrified, the third car employs three current-powered compressor units.

Three additional cars, as described, comprise the "Thermo Train". As may be required, these cars can be employed for depot distribution.

The plant at Helsingborg now serves as a distribution center for about 90% of all frozen retail products made in Sweden. Through its branch organization, Thermotransport, frozen foods are delivered to 40 small wholesaler-owned refrigerated depots around the country. From there, products go to freezer cabinets in stores. There are now some 5,000 cabinets in use.

Meanwhile, consumer demand has been growing rapidly. In fact there has been a six-fold increase in retail distribution just since 1950.

End (Resume reading on page 129)

1,000 Dozen Rolls

—Continued from page 129

time, through a pair of adjustable, stainless steel rolls (6 in. dia.), and then go onto a 30-in.-wide canvas-belt conveyor.

When making 'burger buns, dough balls slide over a short metal plate, set at about a 35-deg. angle on the discharge end of the conveyor. The

doughs then fall, four at a time, into silicone-coated steel trays. These trays, each able to hold two dozen buns, are hand-fed onto a chain belt traveling below the sheeting rolls and the 30-in.-wide belt. Speed of both belts is synchronized so that the rows of four doughs drop onto the tray.

The tray then moves and the next row of doughs falls into it. This continues until the tray holds 24 doughs.

When the line is switched over for frankfurter buns, a specially designed pressure board is attached at the point where doughs pass between the sheet rolllers onto the canvas belt. Board also comprises four chain-mesh curlers (3x5 in.) suspended on a ¼-in. horizontal metal rod at infeed end. The curlers twist doughs leaving the sheeting rolls, elongating them during their travel.

The doughs continue along the canvas-belt conveyor and below the horizontally mounted, adjustable pressure board. Height adjustments of this board are made with four metal knobs.

Baking Details

Trays then are loaded onto 96-doz. capacity racks, traveling on an overhead monorail to the proof box. Following a 1¼-hr. proofing at 104 F. and 90% humidity, the racks are 'railed to the feed end of a 24-tray Peterson oven. Baking takes 9 min., with oven temperatures 420 F. at top and 400 at bottom portions.

Rolls next are dumped from trays onto a table that feeds an 18-in.-wide mesh conveyor traveling through an enclosed, overhead, company-designed cooler. The cooling is achieved by blowers—one 24-in. and three 18-in. —that pull cool, Fiberglas-filtered air from the basement and into the enclosed conveyor via a 24-in. insulated duct.

Cooled buns then are conveyed to the automatic slicing machine. Here, they are fed, four at a time, onto a two-section conveyor, each section comprising five ½-in.-spaced 1-in. rubber belts. Both sets of belts are divided by a 1½-in.-high vertical, stainless steel plate.

Buns continue under a short compression element (comprising eight narrow rubber belts riding over two 6-in.-dia. shafts spaced 2 ft. apart). The compression secures the buns for slicing. Hamburger buns are sliced as they pass under three 8-in. dia., circular, saw-tooth blades, mounted horizontally.

For frankfurter rolls, two 8-in. and three 3-in. blades are mounted.

Sliced buns finally are cellophane-wrapped eight to a package by an Oliver machine.

End (Resume reading on page 130)

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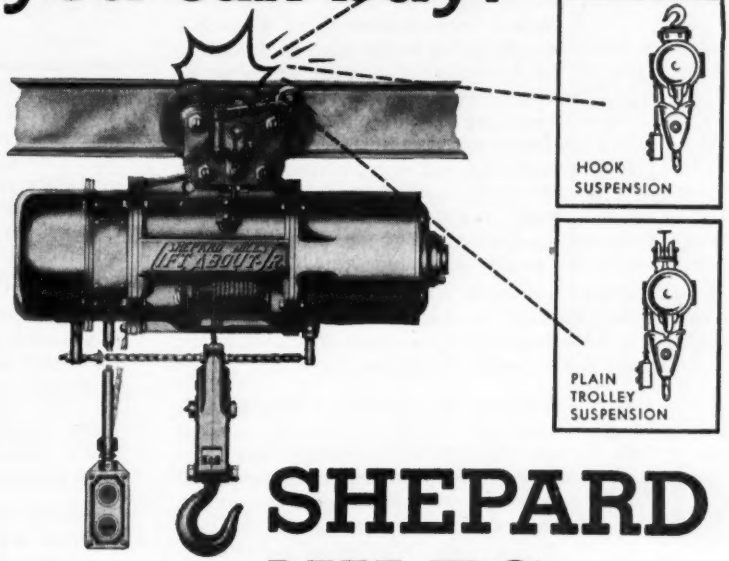

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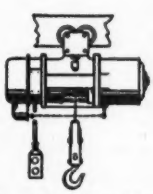

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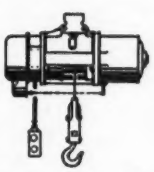

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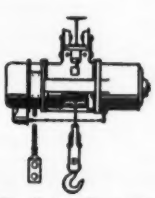

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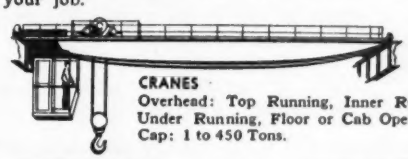

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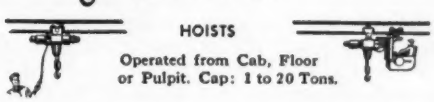

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INSIDE SCIENCE

The Vital Story of VITAMIN C

by Science Writer

What does vitamin C do for human beings?

Medical research shows that it is essential in maintaining healthy bony tissue and for the formation of collagen which is the main supportive protein of skin, tendon, bone, cartilage and connective tissue. It is needed for vascular function and tissue respiration and in promoting the healing of wounds. In lactating women it has great importance in providing the infant with a sufficient amount of ascorbic acid to prevent scurvy, a disease to which very young babies are susceptible.

Much evidence is available in medical reports to show that a lack of this vital nutritive element can result in impaired health. And in those cases of frank scurvy which still occur, ascorbic acid is the specific medication.

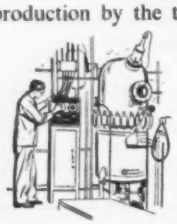
History. The history of vitamin C is fascinating. Scurvy, known for centuries, was once the most prevalent disease in Europe. It afflicted the Crusaders, decimated the crews of voyagers and armies, and plagued the colonists of the New World. In the 18th Century the antiscorbutic value of fresh vegetables and citrus fruits was recognized.

Isolation. It was not until 1918-25 that almost pure ascorbic acid was concentrated from the lemon by Zilva and its important properties and molecular composition established. In 1927 he concluded that this so-called "reducing factor" and the antiscorbutic principle were closely related. In 1928, Szent-Györgyi, who started investigations in 1921, isolated a strong reducing compound from adrenal glands, oranges, and cabbage and termed it "hexuronic acid."

Chemistry. The "reducing factor," "hexuronic acid," and vitamin C were all identified as the same in 1932 by various groups of workers. This was one year after C. G. King, by methods of organic chemistry and experimental physiology, established the chemical identification of vitamin C, thus fulfilling Budd's prediction of 90 years earlier that the antiscorbutic property of certain foods would ultimately be discovered to be a definite substance.

Synthesis. In 1933 Reichstein and his colleagues in Switzerland successfully synthesized ascorbic acid. Almost simultaneously in England Haworth and associates accomplished the same. The Reichstein synthesis formed the basis for large scale commercial production by the world-famous firm of Hoffmann-La Roche.

Production. Following these discoveries came the establishment of manufacturing operations so that today daily production by the tons is the rule. The figures are really staggering. The amount produced weekly in the U. S. A. averages over 15 tons, equivalent to that contained in over 200 million oranges. It is remarkable that ascorbic acid can be produced synthetically and sold for only about $16. per kilogram. One kilo is sufficient to supply 92 people for one year with the minimum daily requirements set by the U. S. Food and Drug Administration.



Vitamin C made by the Roche process is identical chemically and in biological activity with Nature's own product. Because vitamins can be manufactured at a much lower cost than if they were extracted from natural sources they are widely used in dietary supplements and pharmaceuticals. In fact, "New and Non-official Remedies," a publication of the American Medical Association for use by physicians states: "All pure ascorbic acid used in pharmaceutical products is prepared synthetically."

Ascorbic acid is present in many foods. Nature supplies some with lavish amounts and stints on others. In fact, wide variations* have been found in the vitamin C content in varieties of the same fruit.

Deficiencies. Many surveys have shown widespread vitamin C deficiencies in the population. Physicians may call these subclinical, but they are deficiencies nevertheless.

Because of these situations—natural variation and widespread deficiencies—diet experts believe that it is desirable and in the public interest to standardize the vitamin C content of processed fruit and vegetable juices by the addition of enough pure crystalline ascorbic acid to make them consistently dependable sources of this necessary food element. Some of these juices are: tomato, grape, orange, grapefruit, pineapple and apple.

Requirements. The U. S. Food & Drug Administration has set 30 milligrams as the adult minimum daily requirement of ascorbic acid. This daily intake is just about sufficient to prevent recognizable signs of vitamin C deficiencies although a subclinical or an unrecognized deficiency may exist. In view of this, the National Research Council has established 75 milligrams as the recommended daily male adult allowance and 70 mg. daily for female adults, which levels are supported by many controlled nutrition studies. However, the N. R. C. recommends 90 mg. daily for boys between 13 and 15, 100 mg. daily for boys between 16 and 20, and 150 mg. daily for lactating women.

This article is published in the interests of pharmaceutical manufacturers and food processors who make their good products better with essential, health-giving vitamin C. Reprints are freely available. Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec.

*The table shows minimum and maximum levels of ascorbic acid in commercially canned juices. All figures are in milligrams per 100 grams of juice. Data from U. S. Department of Agriculture.

	Min.	*Max.*
Apple juice	0.2	3.6
Grape juice	0.0	4.7
Grapefruit juice	10.0	49.0
Orange juice	9.7	70.0
Pineapple juice	5.4	18.0
Tomato Juice	2.5	32.0

ADVANCES IN TECHNOLOGY

Sweet Potato Donut Mix

A prepared dry doughnut mix containing wheat and sweet potato flours is the object of a recent patent. In the process, precooked sweet potatoes are mixed with soluble solids to form a smooth paste which is blended with additional solids and liquids to form a first flour.

Second flour is made from dry wheat components then mixed with first flour to produce the dry doughnut flour.—*U. S. Patent 2,687,960*, Aug. 31, 1954.

Vacuum-Cooling of Lettuce

So rapid has been the growth of vacuum-cooling of lettuce before shipment that 70% of the 1953 Imperial Valley crop was thus treated, and in Arizona the vacuum pack was 80% of the crop.

The high vacuum produces evaporative cooling in which heat of vaporization is taken from the lettuce itself, resulting in a rapid reduction of the temperature.

Two systems of producing the vacuum are in current use: (1) the steam jet system and (2) the vacuum pump plus refrigeration. Auxiliary equipment for either system comprises vacuum chambers (usually three) each 50 ft. long and 7.5 ft. in dia. Lettuce, packed in cartons and loaded on a platform is pushed into a chamber which has a capacity of one carload per hr. With three chambers one is being evacuated while the second is being "cooled" and the third is being unloaded in the 1-hr. cycle. *Refrigerating Engineering*, 47-49, Sept. 1954.

New Australian Method Speeds Cheesemaking

Objectionable features of the USDA short method for cheddar cheese manufacture have been eliminated in an Australian process that cuts time from the conventional 6-6½ hr. to 3 hr. 20 min.

In the process, 2% normal lactic starter and ¾-1% *Str. durans* are added to pasteurized milk and the vat set at 88 F. with sufficient rennet to set the curd in 25 min.

Curd is cut with standard knives, stirred, then heated to 100 F. in 40 min. Half of whey is run off, then heating is continued to 108-110 F. in 10 min. followed by holding 20 min. Curd is allowed to settle, whey is run off, then curd is banked and allowed to cheddar 30 min., followed by milling, salting, hooping and pressing.

Product resembles well-made cheddar in body, texture and flavor, and its rate of maturing is quicker.—*The Australian Dairy Review*, June, 1954.

New Technique Determines Conductivity Of Insulations at Low Temperatures

Density and "k" factor at —200 F. of 12 commercial insulations have been determined by a new laboratory technique. Used were the Wilkes method and calorimeter with a controlled hot-surface heater and increased capacity to permit "overnight" operation.

Samples fell within three board categories: Rigid, felt, and loose-fill insulation. Results are summarized in the accompanying table.—*Refrigerating Engineering*, 35-37, Sept., 1954.

Type of Insulation	Density Lb./Cu. Ft.	*k* at —200 F. Btu. In./Hr. Sq. Ft. F
RIGID		
Expanded polystyrene board	1.5	0.13
Expanded polystyrene board flameproofed	1.8	0.13
Expanded rubber board	4.5	0.15
Resin-bonded mineral wool board	16.4	0.17
Asphalt-bonded mineral wool board	16.6	0.20
Corkboard	9.4	0.20
Cellular glass block	9.2	0.35
FELT		
Mineral wool felt	4.0	0.12
Mineral wool felt	6.3	0.12
Mineral wool felt	8.0	0.12
LOOSE-FILL		
Silica aerogel	7.8	0.11
Silica powder (fine)	6.7	0.14
Diatomaceous earth	14.0	0.24
Diatomaceous earth	17.0	0.25

Fat-Free Chocolate Syrup

Production of cocoa butter and a fat-free chocolate syrup are objects of a recently patented process, in which finely ground cocoa is heated with water to gelatinize its soluble starch component, then mixture is treated with enzyme to saccharify the starch, and protein is coagulated.

Mixture is centrifuged into an oil-water emulsion and substantially fat-free solid. Emulsion is broken with alkali, then separated into fat—from water-phases. Latter is returned to fat-free solid, then sugar is added to form chocolate syrup.—*U. S. Patent 2,687,959*, Aug. 31, 1954.

Thermal Conductivity By New Apparatus

Thermal conductivity of a number of liquids has been determined in terms of k = Btu./hr./sq.ft./deg.F./ft., using a newly designed concentric cylinder apparatus, with corrections made for effects of radiation and convection.

Allowing for errors due to gas bubbles, and to sample impurities, maximum in data obtained is probably less than 2.5%. Data are presented for water (k = 0.353 at 75.4 F.; 0.391 at 199 F.) chloroform, carbon tetrachloride, glycerol (k = 0.1597 at 111 F.), ethylene glycol (k = 0.1445 at 79 F.), propylene glycol (k = 0.1158 at 79 F.), trichloroethylene, olive oil (K = 0.0970 at 84 F.) fin oil, heat transfer oil, Aroclors 1254 and 1248, and Dowtherms A and E.—*Industrial & Eng. Chemistry*, 1947-52, Sept. 1954.

Insecticidal Resin Is Long-Lasting

By incorporating insecticides into urea formaldehyde resin a new disinfectant is formed which, when sprayed on surfaces, has an effective life of several years.

Depending on pest to be controlled, various insecticides are added to the resin. Dieldrin is toxic to the widest range of insects, but special sprays can be made with DDT, benzene hexachloride, aldrin, endrin, and isodrin.

The lacquer sets within 30 min. to form a clear, transparent, hard film, within which most of the insecticides is safely sealed. Some of it, however, forms a fine bloom of microscopic crystals on the surface.

If the bloom is washed off by scrubbing with detergents, more insecticide is immediately released from the resin to form a new bloom. The resin thus acts as a reservoir for the

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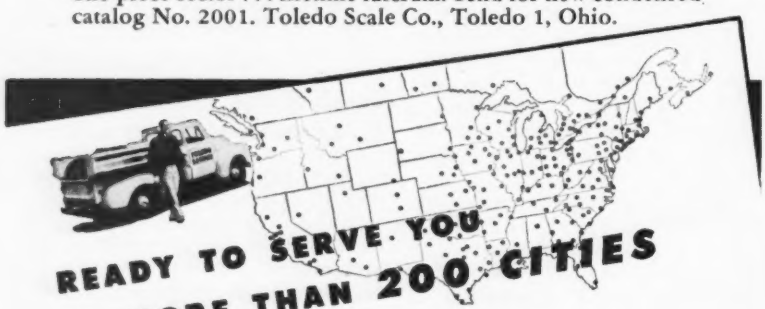

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insecticide, and the blooming process can be repeated for years. The microcrystals are so small that they adhere to the foot of the insect and insure its death.

The insecticidal resin has been proved effective in hotels, cargo vessels, and food establishments. Special care has to be taken in mixing the lacquer in exactly the right proportions with a catalyst, but its application is relatively simple and its effectiveness far superior to that of other insecticides.—*Food*, (London), 332-33, Sept. 1954.

Salt in Brine-Frozen Fish Below Taste Threshold

Penetration of salt during brine-freezing of fish at sea is influenced by temperature, concentration and composition of brine; time of immersion, and whether fish are gutted or not.

Under routine operation, this penetration is a minor factor and, following water thawing, salt concentration of meat directly under skin—where content is highest—is below taste threshold for salt in fish.

These are findings of a study by the Boston laboratory, US Fish & Wildlife Service aboard experimental trawler Delaware, using eutectic (23% NaCl) brine.

Experiments indicated that: (1) Brine temperature should be held as low as feasible—not higher than +10 F.; (2) immersion should be only for the time required to freeze the fish—penetration continues during entire time of exposure, and (3) adidtion of 1% Ca and 0.6% K salts to brine retards salt penetration—salt content of meat frozen in modified brine was 25-33% less.—*Commercial Fisheries Review*, 1-11, Aug. 1954.

Sensitivity and Accuracy Of the Phosphatase Test

Investigation has been made of the influence of certain chemical and physical factors on the activity of milk phosphatase in order to throw more light on the conditions necessary to yield the most sensitive and accurate phosphatase test. Comparative tests were made by: The Sanders-Sager method; official AOAC method (Assoc. Official Agr. Chemists); the Cornell phosphatase test, and Sanders-Hupfer modification of Cornell method. Factors investigated included buffer concentrations, pH values, incubation temperatures, and time periods.

In 1- and 18-hr. tests on milk and 1-hr. tests on cured Cheddar cheese, S-S method yielded highest results. In

18-hr. tests on cheese S-H modification yielded highest results, the Cornell method lowest.

Optional pH for 18-hr. incubation was 9.5-9.6 as shown by Cornell workers, rather than pH 10 of the 1-hr. S-S and S-H methods. In 18-hr. tests on cheese the S-S method, incubation pH about 9.6, gave highest results. Optional temperature for incubation was lower than for 1-hr. incubation. Buffers of relatively high ionic concentration retarded enzyme activity, but concentration of carbonate-bicarbonate buffers did not affect optional temperature.

Buffer concentration, pH, and incubation temperature must be adjusted for maximum enzyme activity. It was possible to compensate for pH variations by adjusting incubation temperature, thus increasing sensitivity and accuracy of a "universal" test.

Average 18-hr. test values on milk and cheese for the three methods were more than 6 times the 1-hr. values. Data suggest that criterion for pasteurization for 18-hr. test should be 6 times that for 1-hr. test.—*Journal of Dairy Science*, 698-710, June, 1954.

Detection of Washed Eggs By Conductivity Tests

In an extensive series of conductivity tests aimed at detecting washed eggs, large average differences were found between the washed and unwashed ones. Results were influenced by voltage input, extraction time, voltage application time, and egg temperature. Consequently, tests were usually made at 15 v. for 30 sec. at about 60 F.

Unwashed eggs have a much wider range of values compared to washed, and the distribution curve is strongly skewed toward higher values which washing tends to eliminate.

Overlapping of the curves, for washed and unwashed eggs, gives a range within which readings cannot be used to identify washed eggs. Minimal error for both washed and unwashed eggs occurs at a conductivity of approximately 0.24 ma. Increasing the number of readings from one to two per egg decreases both types of error. —*Food Research*, 417-23, July-Aug., 1954.

Influence of Pre-Cooking On Beef Dehydration

In a study of the influence of precooking on the dehydration of unground beef tissue it was established that there is no marked advantage of pre-cooked over raw meat.

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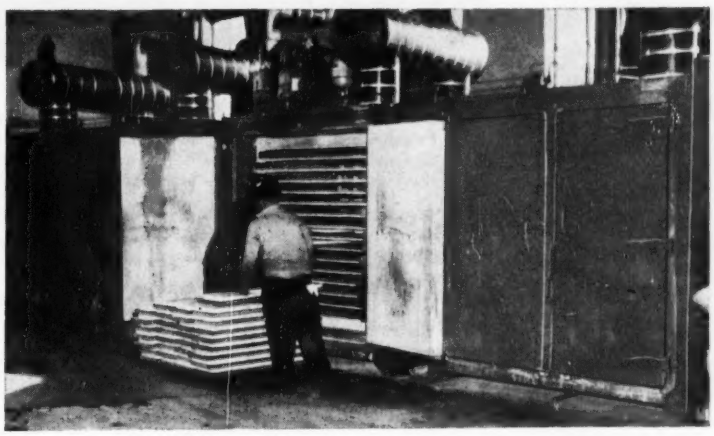

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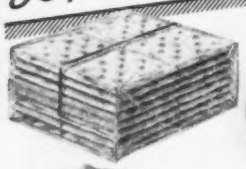

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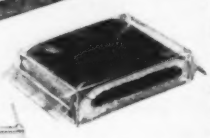

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In one series of tests, cylinders of *Biceps femoris* from a commercial grade carcass were pre-cooked to internal temperatures of 60, 76.6, and 93.3 deg. C. in a beef tallow bath and dried 16 hr. at 45 C. under vacuum and at 70 C. in an air oven. Duplicate cylinders were electrolyzed after pre-cooking and before dehydration.

Another set of experiments was made by cooking large blocks of tissue and then removing the cylinders for further treatment.

Muscle fiber shrinkage was slight, and there was no oil penetration of samples during cooking. There was little difference in potassium distribution. Residual moisture after dehydration was variable, but cylinders from pre-cooked blocks dehydrated to a lower moisture content, indicating that they received more heat than did the individually pre-cooked cylinders.

Electrolyzed samples rehydrated to a higher moisture content than did corresponding samples not electrolyzed, and block cylinders usually absorbed more moisture during rehydration than did the individually pre-cooked cylinders. Greatest water absorption was shown by electrolyzed block cylinders pre-cooked to 76.6 C. and dehydrated at 70 C.—*Food Research*, 429-32, July-Aug., 1954.

High Temperature Storage Influences Lard Flavor

At 95 F. development of peroxides has a detrimental effect on both flavor and color of the stored lards. And even partial hydrogenation did not stabilize the aged lards as markedly as fresh ones.

Prime steam lard (200 lb.) was centrifuged and divided in equal parts. One was stored at −8 F. to retard deterioration, the other at 95 F. At end of 42 days peroxide value of latter had increased from 2.0 to 10.0 me./kg. This was further increased to 19.7 after 65 days storage.

By contrast, lard stored at −8 F. had increased its peroxide value only 0.3 unit. But after melting for sampling and returning to cold storage for 28 days peroxide value reached 4.6 me./kg. High temperature samples were put in cold storage, but deterioration could not be arrested. They continued to oxidize, showing peroxide values of 21.2 and 36.8, respectively, after 28 days at −8 F.

Samples at three levels of oxidation, 2.3, 10.0, and 19.7, respectively, were used for further stability tests for undeodorized lards, deodorized lards, and partly hydrogenated, deodorized lards. Colors of stored lards after deodorization were darker, and flavor stabili-

ties poorer, than those of fresh lards. Peroxide values of stabilized undeodorized lards continued to increase in high temperature storage. Results obtained from carrying hydrogenation to nearly complete saturation showed that peroxides are active catalyst poisons.—*Journal of the American Oil Chemists' Society*, 211-13, *May*, 1954.

New Products From Mixed Acetin Fats

New fats with unusual properties are formed by introduction of acetyl groups into glyceride molecules. Most useful effect is preparation of low melting, or acetin fats, that have a high degree of saturation and increased keeping quality.

Plastic fats made from acetin fat basestock show increased oxygen stability and wider plastic range, in comparison with conventional shortenings. Fresh acetin fat shortenings have textures equal or superior to usual all-hydrogenated type shortenings, but texture differences become more pronounced with aging. Much less firmness is observed in acetin shortenings after two months' storage at 50-100 F. They are very resistant to heat damage.

No evidence of acetic acid odor or flavor was observed in shortenings or liquid basestocks stored at temperatures up to 100 F. for one month. In baking performance, workability, creaming volume, and gum and foam formation the acetin fat shortenings are equivalent to or better than commercial shortenings.

In general, mixed acetin fats may replace normal triglycerides in any edible fat use. Possible inedible applications include plasticizers, tinning oils and hydraulic oils.—*Journal of the American Oil Chemists' Society*, 147-151, *April*, 1954.

Ultrasonics in Brewing

Mechanical energy of ultra-sound has been applied experimentally to brewing materials since about 1951, with some favorable effects, some negative results, and much conflicting opinion as to its merits.

Ultra-sound has a favorable effect on barley germination during malting, especially on those that otherwise require long steeping, and even then germinate poorly. A barley that germinated only 86.6% in 3 days after a 60-hr. steep, germinated 96.4% after a 16-hr. steep with an ultra-sound application of 1000 kc 300 sonowatts intensity.

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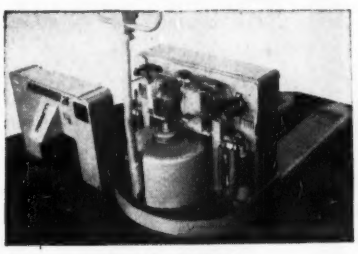
The most "Serviceable" truck ever built!

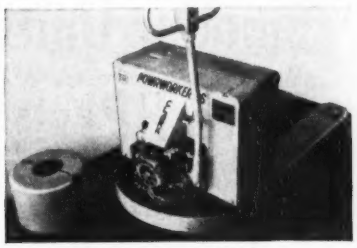
***POWRWORKER* "26" Pallet Truck**
4000 and 6000 lbs. capacity
Also available as platform or tilting fork stacker

Ask him to compare these ACCESSIBILITY features!



1 HYDRAULIC SYSTEM EXPOSED IN 2 MINUTES . . .

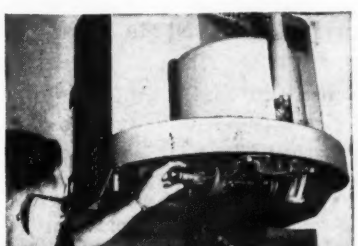
Remove 4 bolts and slip off the one-piece cover; the complete hydraulic sub-assembly is exposed. Hydraulic motor, pump, oil reservoir, valve assembly and self-aligning cylinders are immediately accessible and ample space is provided for quick inspection or removal.



2 POWER HEAD READY-TO-WORK-ON IN 2 MINUTES . . .

Split cover allows complete accessibility to the drive motor, brakes, resistor and control panel by merely removing 7 screws. Revolving head permits servicing any side of the power head without further dis-assembly. For major overhaul, the whole unit can be removed in 17 minutes.

***The POWRWORKER* "26" is only 26 inches longer than the load . . the shortest standard truck on the market!**



3 CHANGE DRIVE TIRE IN 12 MINUTES . . .

Standard Press-on type demountable tire is furnished as original equipment. Raise the truck 12 inches and loosen spanner nut which releases the axle shaft and the wheel drops out. Split wheel rim with spreader inserts allow immediate tire dis-assembly and re-assembly.

CLARK EQUIPMENT

POWRWORKER SECTION
Industrial Truck Division
CLARK EQUIPMENT COMPANY
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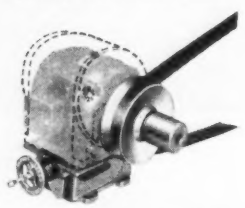
"spiral-groove" lubrication



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2. New spiral-groove lubrication assures complete lubrication for years of rust-free, trouble-free service.
3. One-point lubrication. Unit can be lubricated when stopped, or *while in operation.*
4. Superior base construction provides greater rigidity and strength, reduces vibration and noise.

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application of ultra-sound prior to kilning were about 1.5% higher and quantity of soluble nitrogen was increased. Diastatic power of the malts suffered, though actual output of sugars was not appreciably reduced.

Use of ultra-sonators in brew kettles has led to numerous claims of hop sparing up to 40% or more, not all of them substantiated by actual taste tests. Bitter substances may be considerably increased. Thus one experimenter found that 5-min. of ultrasound (350 kc, 300 w) at 69 F. yielded 460 mg./l. of bitter substances from the same hops that required ½-hr. boiling to extract 330 mg./l.

Best experiments to date indicate that with double extraction procedure (patented) up to 30% of hops normally used may be spared.

That foam or other beer proteins are damaged by ultra-sound seems doubtful, and some trials have shown improved foam after its use. Yeast reacts favorably to ultra-sound, and its fermenting power may be increased by proper application. Experiments on maturing of beer (and spirits) with ultra-sound are incomplete. Sterilization by ultra-sound has not been proved though claims for it have been made in patents. Experimentally, ultra-sound has been found to hasten removal of labels from bottles and their disintegration. — *Wissenschaftliche Beilage, Monatsschrift für Brauerei, Vol. 7, No. 5, 51-54; No. 6, 67-71,* (33 references) *May, June,* 1954.

Bacteria and Mycelium In Aerated Cultures

Lee and Burris found in 1943 that nitrogen fixation bacteria could be grown in large masses by aerated culture methods, and recent experiments have produced as much as 1500g. of *Azotobacter vinelandii* cell paste in a single 300-l. fermentation. Production was intended for extraction of enzymes, especially those of the respiratory group. About 12.6 mcg. N_2 was assimulated per mg. of the sucrose utilized.

In 1948 Humfeld at WRRL found that mushrooms could be propagated by aerated submerged culture growth. Twenty species of this fungus have been grown in this way. While the mushroom paste obtained is palatable, and the reactions of taste panels are favorable, the characteristic flavor is not detectable.

Large scale growth of algae with ultimate food uses in mind was also begun in 1948 by von Witsch, who achieved yields of 5g. of dry cells of *Chlorella* per liter in 20 days. Forty-seven species have been tested for yield, some of them in 100- to 1000-gal. glass-lined

tanks artificially illuminated and aerated. *Chlorella vulgaris* Beyerinck, and *C. vulgaris* var. *viridis* were the best in yield.

Tank fermentations of 2500 liters lasting as long as 280 hr. gave crops of 10-18 kg. of centrifuged *Chlorella* cells. These contained 17-36% protein, 4-11% lipides, and 37-57% carbohydrates. Deep tank cultures of algae for production of algal sterols and vitamins seems to offer many advantages in technical control of the process.—*Applied Microbiology*, 125-30; 135-40; 170-172, May 1954.

Changes in Flour During Storage

Despite the small amount of wheat fat (about 0.8%) in flour, oxidative and other changes during storage affect color, baking properties and bread quality.

Improvers or oxidizing agents act on flour lipides producing changes which can be detected by examination of the petroleum ether extracts. Thiobarbituric acid gives a pink color with extracted flour lipides, and the thiobarbituric acid (TBA) value is increased from about 2 in untreated freshly milled flour to 7 in Cl_2O_2 treated, and to 9.7 in NCl_3 treated flours.

When the petroleum ether extracts are held for several days (up to 9) the TBA values increase. Freshly milled flours do not show this effect, and storage does not bring it out for some weeks or months, and then to a much lesser degree.

Quantity of reducing substances in untreated flour is of the order of 1500-2300 mcg./100g., and changes very little with time. Oxidizing agents reduce the level to 500 mcg. or less. These results suggest some destruction of the tocopherols and other natural antioxidants. The methods also serve to identify flour that has been treated with NCl_3 or Cl_2O_2 and approximately to what degree.—*Nature*, (Supplement), 449-52, Sept. 4, 1954.

Reasons for Moldiness Of Bulk Stored Wheat

Tests on wheat stored in commercial bins indicate that average moisture content gives no adequate clue to range of moisture content that may pervail during storage.

In fact, data on moldiness of samples buried in various parts of a bin show quite conclusively that large fluctuations in moisture content must have prevailed in order to account for the invasion of *Aspergillus flavus* and other molds.

This fungus will not invade wheat until moisture content is between 17

Exposes foreign matter and residue! Resists oils, acids, alkalies!

Globe White Neoprene Rubber Belting installed on leading make conveyor.

EXPOSED: Dust, dirt and other accumulations! Product particles that are left behind!

The snowy whiteness of Globe White Neoprene Belting exposes them all to certain detection, enabling immediate elimination with hot water or live steam. *That's sanitation-plus!*

Known as the do-all conveyor belting of the food industry, for which it was specifically developed, Globe White Neoprene Rubber Belting consists of multiple layers of hard-woven, light duck, molded together with highest grade neoprene rubber between the plies and over the entire surface . . . finished with a 3/64" thick, satin-smooth cover on the carrying side and with a friction surface on the pulley side.

The characteristics of this type of construction are unmatched: Exceptional flexibility; high tensile strength; minimum stretch . . . all extremely advantageous in operations where head and tail pulleys are small, and on machines with limited take-up facilities.

Resistant to oil, grease, acids, alkalies — possessing a satiny smoothness that makes no impression whatsoever on the product conveyed, Globe White Neoprene Rubber Belting is today on the "must" list of numerous food processing and handling concerns. Also available in Black. Ask about Globe White Ruff Top Neoprene Incline Belting, Globe Brown Neoprene Belting, with friction surface on both sides, and Globe Brown Kling-Top Neoprene Belting, with non-slip top for incline and decline.

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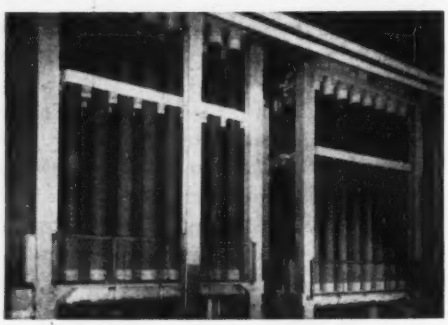
5 reasons for using DAY "AC" (HERSEY TYPE) DUST FILTERS for efficient dust control

DAY Dust Filters are doing an outstanding job in a wide variety of applications. Here are five reasons why so many food processing companies use (and reorder) DAY Dust Filters.

1. **Sanitary construction throughout. Furnished with or without housing—for pressure or suction using only one main dust fan.**
2. **Constant resistance resulting in constant air volumes.**
3. **High pressure reverse jet cleaning of filter tubes gives high air-to-cloth ratio. Minimum space required.**
4. **Self-adjusting blow rings assure perfect tube cleaning, giving maximum air volumes at lowest pressures.**
5. **No shut-down to clean. Constant, automatic operation.**

DAY service includes surveying your dust problem, engineering a practical solution and manufacturing the required equipment. DAY makes Exhausters, Cyclonic Separators, Filters, Piping, Fittings, Hoods; in fact, everything needed to complete your dust control system. This ONE UNDIVIDED RESPONSIBILITY assures you a more efficient installation.

If you have a dust control problem, whether it involves a complete dust control system or a single unit, your inquiry is invited. WRITE FOR BULLETIN 528-R.



Two of the eleven DAY "AC" Dust Filters used by Pillsbury Mills, Inc., in their cake mix plant at Hamilton, Ohio. Space and headroom were at a premium, another reason why DAY Dust Control equipment was selected.

DAY SINCE 1881 DUST CONTROL
A SINGLE UNIT OR A COMPLETE SYSTEM

The **DAY** *Company*
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and 18%, and yet average moisture content of samples stored in one bin was only 12.1%, with a range of 10.3-15.7% in 39 samples, all of which were infected.

Two 15,000 bu. bins in Richmond, Va., and one 45,000 bu. bin in Minneapolis were used for this study. One-pound bags of wheat with a moisture content of 12% were buried at known locations as the bins were filled with commercial wheat of about 13% moisture. Periods of storage ranged from 4 months to 3 weeks, and moisture determinations were made on samples when bins were emptied.

Samples from both bins at Richmond were invaded by fungi, although percentage moisture in each was well below level at which invasion could take place. Germination of grain in sample bags dropped from an original 96% to an average of 70%, with 7 samples showing an average of less than 50%. In Minneapolis the drop was only 10-15%.

It is concluded that at least a significant part of the deterioration of the samples followed this course: (1) Increase in moisture content in certain parts of the bin, significantly above the average moisture content of the bin; (2) invasion by storage molds, accompanied by (3) decrease in germination, sometimes followed by (4) the appearance of sick wheat.—*Cereal Chemistry*, 206-16, *May*, 1954.

Milk From Groundnuts

Production of a milk substitute from groundnuts which has the nutritive value of cows milk has been investigated in India.

Nuts used in the trials were: Coromandel, Bombay Bold, Red Natal, and Khandesh. They are decorticated in unit fitted with blower to separate shells from kernels. Mild roasting loosens cuticle. It is detached together with the germ by mechanical rubbing.

Nuts are ground, then mixed with 5-6 times their weight of water. Filtration separates milk from fiber. Emulsion pH is adjusted to 6.8 with lime water, then it is heated to boiling followed by bubbling steam through for 30-60 min. to remove nutty flavor.

Milk is then cooled to 50 F., fortified with Ca and vitamins, and sufficient water added to make 1-gal. for each lb. of kernels processed. Then comes homogenization.

When adequately deodorized, the product has a characteristic flavor that does not resemble animals milk. Various attempts have been made to superimpose synthetic flavors that will improve acceptability of product as a drink. When subjected to lactic acid fermentation and converted to a curd,

the characteristic flavor is masked by the fermented flavor. Also, the fat may be separated by centrifuging to yield a cream of 20-40%, which when flavored with a small quantity of diacetyl, is hardly distinguishable from cow or buffalo milk cream.—*Food Manufacture (pub. in London)*, 271-75, *July*, 1954.

Tocopherols Give Pepper Good Storage Qualities

Experimental work has shown that good storage qualities of black pepper spice—resistance to oxidation and microbiological growth—are due to its high concentration of tocopherols and oleoresin.

Ground black pepper spice, oleoresin obtained therefrom, apopiperine, isonicotinyl hydrazide and two other hydrazides chosen for their structural relationship to piperine, were tested for antioxidant activities and antogenism to bacterial growth.

Black pepper spice, piperine, apopiperine, and isonocotinyl hydrazide allowed no fungal growth at 0.1% concentrations, and very little at 0.01%.

Ground black pepper spice at 0.1% concentrations is antagonistic toward growth of bacteria, but isonicotinyl hydrazide showed no bacteriostatic properties.

Pepper oleoresin and all three hydrazides showed definite antioxidant properties in concentrations of 0.1%. Since acetylated and hydrogenated pepper oleoresin showed no antioxidant activity, it was concluded that the tocopherols are responsible for anti-rancidity properties.—*Food Research*, 373-76, July-Aug., 1954.

Prevents Sandy Ice Cream

Adequate seeding of ice cream mix with small size lactose crystals, (3-7 μ dia.) just before, or during freezing, prevents formation of large crystals and, consequently, development of sandiness during storage.

This seeding causes the supersaturated lactose solution to form crystals not larger than 10 μ which do not impart the feel of sandiness.

Presence of too few nuclei, or too many large ones, result in rapid growth of large crystals and accelerates sandiness development.—*Journal of Dairy Science*, 1099-1105, Sept. 1954.

Photographed underwater at Weeki Wachee Spring, Florida

Daring Explorer makes Patapar underwater test

This fellow likes to do everything the hard way. But you don't have to go to this much trouble to prove that Patapar Vegetable Parchment really does have an almost unbelievable WET-STRENGTH. You can soak Patapar for hours and hours — even boil it — but it still stays strong.

Patapar resists grease too

Patapar resists the penetration of fats, oils and grease just as effectively as it stands up in water. These qualities make it ideal as a food wrapper and for many other uses. And — Patapar is NON-TOXIC.

Some of Patapar's many uses

Patapar is produced in different types that meet all sorts of exacting requirements. Some of its diversified uses: wrappers for butter, poultry, margarine, ham, bacon, pork loins, cheese and other moist foods; milk can gaskets; rubber releasing separators; translucent master sheets for direct print copy machines; dialyzing membranes; in hospitals for wrapping articles to be sterilized in live steam. It is furnished in rolls or sheets, plain or beautifully printed with colorful designs.

In your business perhaps there is a job that could be done better with Patapar. Tell us about it, and we will send information and testing samples of the type of Patapar we recommend. Write today.

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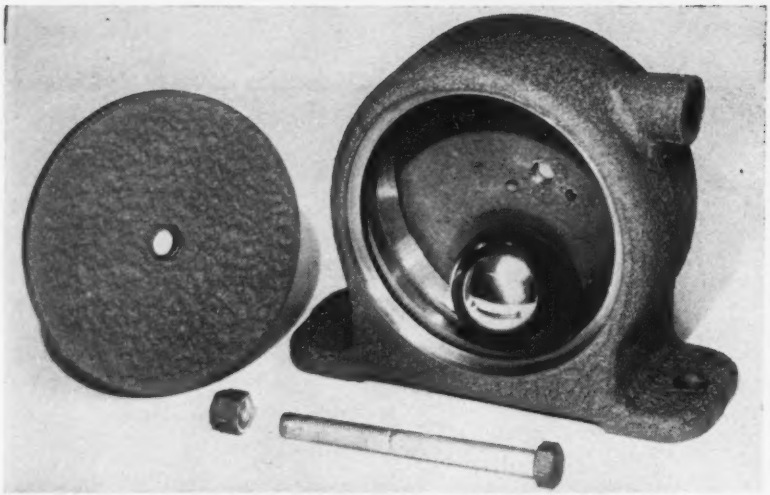


NEW AIROVIBER MOVES BULK MATERIALS QUICKLY, QUIETLY, AND EFFECTIVELY...

AiroViber simple design provides dependable, trouble-free vibration

This new method of external vibration can be used to good advantage in loading, unloading, moving, packaging, processing, grading or separating bulk materials.

The AiroViber is able to deliver effective and dependable vibration with only one moving part, a heavy steel ball running on a circular track. The pounding usually associated with the ordinary types of vibration has been eliminated with the special noise lessening design, exclusive with AiroViber.

Simplified Design

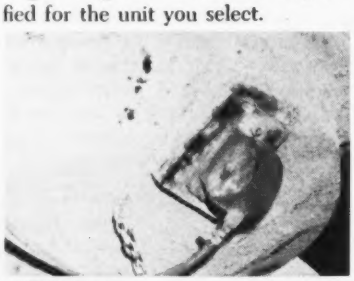
AiroViber's one moving part is a steel ball. An air jet blows it at high speed around a ground and hardened steel track in the housing. The weight of the ball develops a strong centrifugal force, which the vibrator transmits through its mounting into the object to be vibrated. It will start and operate under any condition and performs at high or low temperatures. AiroViber is not affected by humidity.

Trouble-Free Operation

The AiroViber is almost fool proof in operation. Because it has no close fitting parts to lubricate or adjust, it will start every time you open the air valve. You can install it in hard to get at locations with full confidence that it will operate without lubrication or maintenance for a long time.

No Installation Problems

AiroViber is easy to install. It does not need any special line oilers or air filters. Merely hook up an air hose large enough to deliver the air specified for the unit you select.



AIROVIBER rotary vibration breaks up arching and jamming in bins, hoppers, chutes, feeders, and other places where bulk materials hang up. It is also recommended for vibrating tables or platforms, sorting and many other applications.

AiroViber is a product of Viber Company, leader in the field of vibration. For further information, write: Viber Company, 726 South Flower Street, FE-70, Burbank, Calif.

VIBER

CONCRETE VIBRATORS SINCE 1931

Productive Maintenance

—*Continued from page 92*

The maintenance man responsible for this piece of equipment can, by referring to the card filed under the equipment number, immediately determine which renewal parts are authorized for stock and identify these parts by number.

Set up a standard inventory control system. Here, your objective is to make sure that the inventory money works to the best advantage. First, find out how to control your renewal parts stocks. It is an important job—and one that keeps getting tougher.

Stocks Keep Growing

Each year, improvements and new construction make it necessary to install more and more complex electrical equipment. In turn, you must stock a growing variety of relays, solenoids, limit switches, timers, electronic tubes, and other parts. These new additions do not displace existing stock; rather, they add to it. You must be constantly alert if you are to prevent inefficient stocking conditions.

Your first problem is that of turnover. This is simply the total cost of the parts and material moved in a year divided by the yearly average value of the inventory. Fig. 1 demonstrates the amount of capital released and the reduction in carrying costs as the number of turnovers increases. It is based on a 12% carrying cost consisting of the interest on money invested in the stock, shipping and handling costs, costs of storage and insurance, wages of stock clerks, losses due to obsolescence, etc.

Targeting Optimum Turnover

Remember, for every part there is an optimum turnover point. The cost of acquisition should be carefully balanced against the cost of possession. Too fast a turnover will also penalize you.

Set up a plan that will make renewal parts immediately available for routine maintenance and repairs. To control the stock problems outlined above, the mechanics of a typical inventory card system must be clearly defined.

A properly organized inventory card system will enable you to obtain optimum turnover rates on all items, help prevent overstocks or understocks, avoid obsolescence losses. All of these advantages have been gained by the system outlined below, which is in operation in several GE plants.

Steps 4 and 5, covering evaluation

and programming of critical maintenance, will be detailed in the concluding Part II of this article to appear in Dec. FE.

End (Resume reading on page 93)

Engineered Truck Bodies

—Continued from page 112

seals to keep the cold air in and the warm air out.

11. Load Flexibility Assured

No matter what the products or arrangement pattern within the capacity of the bulk delivery trucks, body interior can be adapted and load adequately secured.

Elevated at suitable height is a strongly reinforced demountable shelf, each section of which is held in place by metal lugs–(A) in photo–through holes in the heavy angle-iron supports. Shelf depth can be varied as required.

Milk cans or other load items are secured and prevented from shifting by means of a strong chain hooked to anchor rods (B) regularly spaced along both sides of the body. Chain tension is varied by special clamp arrangement (C).

12. Two-Function Bumper

Most of the faults of conventional truck bumpers have been overcome by a practical design.

Commonly, the rear bumper on a truck takes more severe punishment than the front. Contact is almost always made with a jolt when a vehicle is backed up to a loading dock. Unless there is ample "give" to absorb the impact, truck body suffers a shock, even if no real damage occurs to the bumper or to the tail end of the body.

A redesign, therefore, not only called for construction of a bumper–(1) in photo–from heavy gage metal, but also for one to operate through a spring-loaded shock absorber (2).

Providing space for spring contraction requires locating bumper approximately 1 ft. from the truck frame. This made it possible to install a rear-end platform (3), one side of which is welded to the top surface of the bumper, the other side merely resting on the rear-frame cross member.

This plate, bridging the space between dock and body, serves a safety function. It also provides a place for the driver to stand when opening or closing doors, or while filling or emptying the truck.

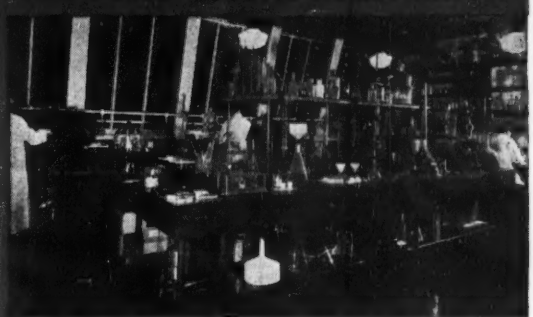
End (Resume reading on page 113)

LOW-COST PRODUCT PROTECTION

For over forty-five years **NULOMOLINE®**—the *pioneer* invert sugar – has been used as a "BALANCING" ingredient by Bakers, Candymakers, Syrup Processors, Fruit Preservers . . . in frozen foods, desserts, icings, toppings, spreads, and other food preparations.

NULOMOLINE is hygroscopic . . . attracts, retains, and equalizes distribution of moisture . . . retards crystallization . . . increases osmotic pressure . . . stabilizes density of syrup portion . . . resists fermentation . . . controls texture and consistence . . . promotes product uniformity . . . improves taste and appearance.

USE NULOMOLINE . . . THE LOW-COST HYGROSCOPIC HUMECTANT . . .



Packed in large and small containers– in tank wagons and tank cars.

ORDER DIRECT OR THROUGH YOUR JOBBER.

Write, phone, or call and discuss your problems in confidence with **NULOMOLINE SERVICE.** Our technical and practical staffs are *at your service!*

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Questions & Answers

THIS MONTH'S PROBLEM

Trouble Cleaning Boiler

Question—Our water-tube boiler has been in practically continuous service for some 20 years. We have always practiced feed water-chemical treatment and have endeavored to keep the tube inner surfaces clean by periodic use of mechanical tube cleaners. However, on recent internal examination, it was discovered that there is a thin, but very hard, scale on many tubes. Is this condition serious? If so, can you suggest how the scale can be removed?

SEPTEMBER PROBLEM

Smoke Gets in Their Eyes

The Question Was—Our smokehouse is along one side of the sausage-processing room. Every time the smokehouse doors are opened, smoke pours in. When this happens, personnel must stop work and leave, only to return and commence operations when the room becomes smoke-free. Do you know of anything that can be done to overcome this situation?

Answer From the South

I have run into this same problem while operating several small sausage kitchens. What I did was to have a good tinsmith build a metal hood over the front of the smokehouse doors. Hood sloped upward to the center, where a large smoke stack was extended about 15 ft. Hooked up to the top of the stack was a motorized exhaust fan.—*Chester McConnell, New Orleans.*

Reply From Wisconsin

I'd suggest the installation of intake fans in the sausage processing room. Such fans would create positive air pressure in the room. And, when smokehouse doors opened, air would be forced into the smokehouse to keep smoke from coming out into the processing room.

This system, with modifications, or its reverse—producing negative pressure with exhaust fans—is sometimes used to control aerial contamination during cheese curing. It is also employed to control milk dust where positive pressure would create a problem during some powdering operations.—*Francis Zepp, Fountain City Co-Operative Creamery Assn., Fountain City, Wis.*

How Would You Do It?

Readers are invited to submit to FOOD ENGINEERING answers to question, "This Month's Problem." Selected answers will be published, with credit (unless you specify otherwise). We pay space rates.

What is *Your* Problem?

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free, to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

Views on Boilers Needs

Question—We have recently acquired a cannery with coal-fired boiler facilities. Our plans call for expansion, for which additional steam will be needed. We would be interested in your views on the relative merits of coal and oil for the added equipment.

Answer—Selection will depend upon several factors, chief among them being: Initial cost of equipment including installation, probable fuel costs during life of equipment, operating labor requirements, space available, reliability, and flexibility.

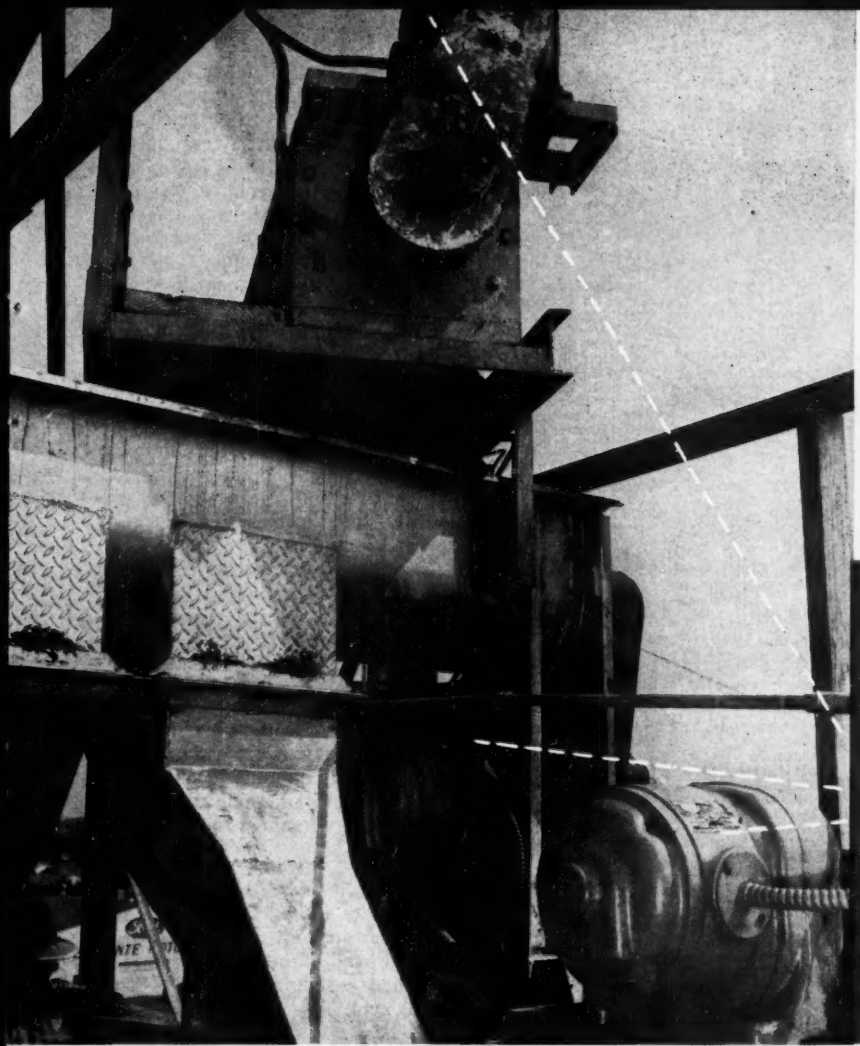
In obtaining quotations on the two types of equipment, you will probably discover that both are offered today in so-called "packaged" units.

It is important in making your cost comparisons to be sure that you know exactly how much steam output each unit will deliver. Some units are rated at so many boiler horsepower (1 bhp. being equal to approximately 34 lb. of steam generated per hour). On the other hand, others are rated directly in terms of pounds of steam per hour. In the case of the former ratings, it often happens that the units (if equipped with stoker or pulverized-fuel firing) are capable of continuously delivering 200% and more of the boiler's nominal rating.

First, then, be sure that the initial equipment costs are related to pounds of steam produced, so that your comparisons will be on a common basis.

Next, consider such costs as rigging into position, foundations, excavating, and stack requirements. Cost of steam piping will be approximately the same.

Now add the expense of fuel-handling equipment. For coal, you



A. C. S. CO. RECOMMENDS SLO-SPEED FOR GRAIN AND FEED MILLS

In the manufacture of grain and feed mill machinery and in installations of complete plants we use Sterling Electric Power Drives, reports Mr. Albert R. Padille, President of the A. C. S. Co., El Monte, Calif. In installations where drives have to be mounted in rather inaccessible locations, use of Slo-Speed Electric Power Drives is the best assurance for trouble-free operation.

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How to select the right liquid meters

. . . to save time and ingredients, with closer quality control, and more accurate cost accounting. That's the subject of this helpful free bulletin. It covers meters for measuring hot and cold water, oils, syrups, brines, soap solutions, and many other chemical solutions that can be handled by composition bronze meters. Illustrates sizes from ½" to 6", with rates of flow to 1000 gpm. Registers range from simple counters to the newest Auto-Stop automatic batching meters. A gold mine of information for any processing engineer. Bulletin 566UF

Acetate, Amyl
Acetate, Butyl
Acetate, Ethyl
Acetate, Lead
Acetone
Alcohol, Amyl
Alcohol, Ethyl
Alcohol, Methyl
Ammonium Nitrate Solution
Ammonium Sulfate Solution
Asphalt, Liquid
Banana Oil
Barium Chloride
Benzol
Boiled Oil
Borax Solution
Brine
Bronzing Liquid
Bunker "C"
Butanol
Calcium Chloride Brine
Carbon Bisulphide
Carbon Tetrachloride
Castor Oil
Cellulose Solvent
China Wood Oil
Chloropicrin
Chocolate
Cleaner, Asphalt Tile
Cocoa Butter
Coconut Oil
Code Rubber Oil
Coffee
Condensate
Corn Molasses
Corn Syrup
Cotton Seed Oil
Crude Oil
DDT
Dextrine Solution
Diacetone
Dibutyl Phthalate
Diethyl Carbitol
Diethylene Glycol
Diethyl Hexyl Phthalate
Dimethyl Phthalate
Dioctyl Phthalate
Dope (Nitrocellulose)
Esther Gum Oil, Drying
Ethyl Cellosolve
Ethylene Glycol
Fish Oil
Formaldehyde
Freon
Fuel Oil, Hot
Glucose
Glue, Water Solution
Glycerine
Grease
Ink, Oil Vehicle
Ink, Water Vehicle
Isobutylene
Isopropanol (Isopropyl Alcohol)
Kerosene
Lacquer
Lime Water
Linseed Oil
Liquid Soap
Liquid Sugar
Lubricating Oil, Hot
Lubricating Oil
Mesityl Oxide
Methylated Spirits
Methyl Bromide
Methyl Cellosolve
Methyl Formate
Methyline Chloride
Mineral Oil
Mineral Spirits
Molasses
Monochlorbenzoil
Naphtha
Nitrocellulose Lacquer
Oleic Acid
Oleum Spirits
Orthodichloro Benzine
Paint
Paraffin Oil
Paste
Perfume
Petrolatum
Pine Oil
Plasticizer
Polymer, Molten
Potassium Carbonate
Propylene Glycol
Pyrethrum Mixtures
Rum
Shellac, Alcohol Sol.
Silicone Oil
Silicon Tetrachloride
Size Solution
Soap Solution
Sodium Benzoate
Sodium Carbonate
Sodium Chloride
Sodium Silicate
Soy Bean Oil
Starch Solution
Stearic Acid
Stoddard Solvent
Styrene Monomer
Sugar Syrups
Tallow
Tannic Acid
Tire Compound
Trichlorethylene
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will have to expand existing bunkers and, possibly, conveyors although, presumably, you already have car-unloading and other facilities.

For oil, on the other hand, you must figure fuel tanks, pipe-lines, probably oil pre-heaters, and starting facilities (light oil tank or gas supply).

A particular requirement for coal, alone, is the ash removal and handling equipment. If pulverized coal is being considered, you must take into account the pulverizer-power requirements, which may call for additional electric power installation.

When all of these factors are checked, you will have a pretty good idea of comparative initial costs and will also know comparative depreciation and interest charges.

Next, you must size up fuel costs. No doubt you have records of actual coal costs on a delivered basis, which will give you a good picture of what to expect for this fuel. Over a period of years, coal prices have risen considerably, but recently they have seemed to level out and competition of other fuels may keep them fairly stable.

There is more fluctuation in oil prices. Here, you will do well to carefully investigate, since your cannery peak loads do not coincide with heating season peak demands. This way you might be able to work out an advantageous contract. It would be advisable to review delivered-price history at your location.

Finally, there is the question of labor requirements. If you have mechanical firing and figure on additional equipment of like kind, it is probable that your present fireman force can handle the new unit. Of course coal will entail more handling of fuel and ashes, and additional help for these operations may be necessary. For oil, negligible extra help will be needed.

When it comes to space requirements, it is quite probable that you will find a packaged oil-fired unit will take up less floor space in the boiler room. This might be a decisive factor where space is limited.

Beyond all these considerations, which mostly can be reduced to con-

---

Q.—We'd like formulas for making crushed peach, pineapple, raspberry, and strawberry toppings for soda fountain use.

A.—Rapidly cook to 222 deg. F.: 100 parts of fruit, 75 parts of sugar, and 30 parts of corn syrup. Cool batch to 150 F. and fill into cans. Seal cans and then pasteurize at 190 F. and rapidly cool.

---

crete dollars and cents values, are the less tangible ones of reliability and flexibility. Since a cannery cannot afford a serious breakdown during its season, the advantage of having a second fuel should not be under-rated. It is good insurance against difficulties—in short, may keep your most essential equipment operating and prevent serious losses.

Product-Handling Problem

Question—To make use of gravity flow to best advantage in our multi-story candy production, we planned to drop one product to the floor below, via a metal chute. Unfortunately, the product can't stand this drop without damage. We don't want to put in an expensive facility. Could you suggest a simple, low-cost solution?

Answer—One of the simplest methods would be to equip your chute with staggered baffles that would break up the one big drop into numerous, small, harmless ones. Depending upon the nature of the product, you might want to make these baffles of metal, or possibly even something softer, like rubber.

We suggest that you experimentally determine how large a drop this product can safely stand, and use this value in spacing the baffles. The baffles themselves probably should be installed at an angle to the horizontal, so that the product will roll off each one easily, and so on down to the next one.

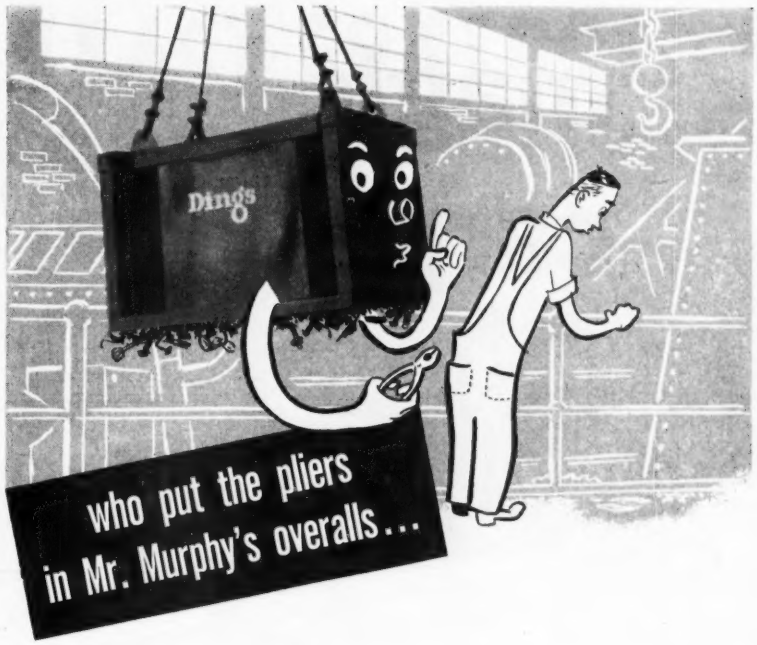
Assuming you already have a chute that has proved unsatisfactory, it might be possible to use it if you can open it up by removing one side to get at the interior for installing the staggered baffles. If so, it would be highly desirable to reconstruct the chute so that this side is readily removable for later access for cleaning.

Then, if any sticky material should accumulate, or if any "bridging" chanced to occur, it would be a quick and simple matter to correct. Otherwise, with a series of more or less horizontally projecting baffles to contend with, the job of cleaning from either top or bottom would almost be impossible.

This is an important point to bear in mind in all food-equipment design.

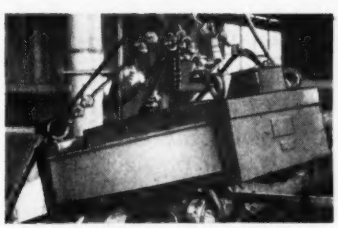
Pulverizer Overheats Product

Question—One of our products is a powdered prepared mix containing considerable starch. Lumps produced in our process are eliminated by passing the mix through a hammer-mill type of pulverizer, and we are satisfied with the fineness of the finished prod-



MURPHY is what we'll call the chief engineer in the Omaha plant of one of the nation's largest grain processors. Here's his story —

One day, not long after his Dings RM Suspended Tramp Iron Magnet was installed, he was wishing he had a pair of long nosed pliers. Shortly after, one of his men walked up and handed him a pair. They'd been pulled out of a 12-inch conveyor belt burden of corncobs by the Dings RM Magnet.



THIS IS THE MAGNET THAT CAUGHT THE PLIERS — That junk on the bottom is a typical tramp iron accumulation — crushed "tin" cans, wire. "Murphy" reports even crowbars occasionally find their way into the corncobs processed in his plant.

Murphy was awfully glad to see those pliers and not just because he wanted a pair. He was thinking of what they would have done to the hammermills and other processing equipment fed by that conveyor, if they hadn't been caught by the Dings Magnet.

You might think about that, too. What's it costing you to "process" tramp iron in your plant? It isn't necessary. Your Dings representative can show you an economical way to eliminate tramp iron with a Dings Magnetic Separator.

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uct. However, we are troubled by a slightly scorched flavor, which we have been unable to account for and eliminate. Could you suggest what might be the trouble? And the cure?

Answer—We understand that products of this character are somewhat heat-sensitive. Also, we have heard of instances where the heat generated in the pulverizer caused just such a condition as you mentioned. This would likely be true if the pulverizer happened to be one you had on hand from some other operation, and so was not specifically designed for the work.

If temperature readings and a study of samples of the mix before and immediately after pulverizing show this to be the trouble, then there are at least two remedies, with your choice depending on local conditions, availability of usable materials, etc. One would be to fabricate a jacket for the pulverizer housing, so that cooling water can be circulated around it to absorb and remove some of the heat generated.

If this presents serious problems, because of water shortage or because it would make access to the interior for cleaning and maintenance too difficult, a second possible solution would be to provide a connection at one end of the mill for an air inlet and at the other end for exhaust. Then a current of chilled air could be circulated through the mill to hold down the product temperature.

In this case, an air-cooling unit and blower would be needed, and in all probability a dust collector and means of returning the fines to the product as well.

Q.—Can you furnish me with directions for manufacturing chub-style packaged sandwich spread?

A.—Grind through a ⅛-in. plate: Bacon ends, 30 lb.; minced ham, 40 lb.; cooked ham, 44 lb.; wieners, 90 lb.; ring bolgna, 96 lb. Load meat into mixer, start agitator, and sift in 2 lb. of sugar, 6 lb. of salt, and 30 lb. of cracker meal. Following thorough mixing, blend in 170 lb. of sandwich spread. Hold batch in cooler until ready for stuffing.—Formula by Wass Food Products Co., Chicago.

Ways to Make Relish

Question—Can you furnish us with a formula and directions for making hot dog relish?

Answer—Individually chop fully cured pickles, cauliflower, and onions. Pickles should be cut to 5-mm. size,

Preparing Coffee Cake

cauliflower to 9-mm., and onions to 10-mm.

Now weigh into a suitable container: Chopped pickles, 22½ lb.; cauliflower, 9½ lb.; onions, 1¾ lb.; and tumeric, ½-oz.

After thorough mixing, hold batch until next day. Then add, with mixing: Chopped peppers, 1¼ lb. and celery seed, ½ oz.

Again mix, and then add 4 gal. of brine. Brine should test: Specific gravity, 1.160; acidity, expressed as acetic acid (by weight) 3.5%; soluble solids (refractometer at 20 deg. C.), 35.8%; Brix (at 20/20) 35.8 deg.; and Baumé (at 20/20), 19.7 deg.

Fill into jars, cap, and label.

Making Macaroons

Question—Can you furnish me complete instructions on making macaroons?

Answer—Mix well 1 lb. of fine powdered sugar and 3 fl. oz. of egg white. Cut 1 lb. of almond paste into small pieces, add to above mixture, and mix well. While mixing, gradually add 3½ oz. of egg white. Continue mixing to a lump-free, smooth batter. Drop macaroons on double paper-lined tins and bake in the temperature range of 320 to 330 F.

Needs Two Dressing Formulas

Question—My company is manufacturing mayonnaise, salad dressing, and French dressing. Currently, it is considering including sandwich spread and Thousand Island dressing. Have you simple directions for making these two items?

Answer—To get you started and to enable you to determine if you'll like the formulas, we'll provide you with them on the basis of approximate 10-lb. batches.

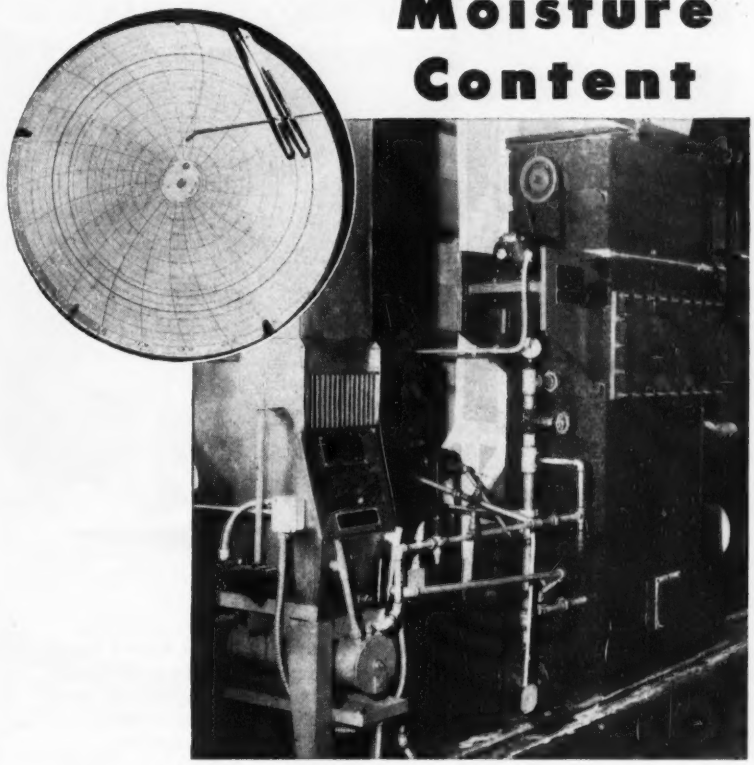
To make sandwich spread, add to 6 lb. of your salad dressing (as the base) in a mixing bowl: Salt, 2¼ oz.; sugar, 6½ oz.; sweet relish, 3 lb.; and brine-cured, chopped red peppers, ½ lb.

Thousand Island dressing can be prepared by mixing, at low speed: Salad dressing, 7½ lb.; chili sauce, 2 lb.; vinegar (white), 4 oz.; and onion juice, 0.8 oz. Now add ½ lb. of well-drained sweet relish, and mix.

Q.—How often should silicone coatings be renewed on bread pans?

A.—Pans should be regularly recoated after loaves have been released from them 200 times.

EXACT CONTROL of Moisture Content



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● This Niagara Air Conditioning Method dries air directly and measurably, using a moisture-absorbing liquid spray. It makes humidity control a separate function from lowering or raising temperatures and gives you precise control with thermostats alone; no moisture-sensitive devices are needed. You have simpler, more trustworthy, less expensive control instrumentation. Niagara precise-control installations have the best record for reliability.

Niagara Air Conditioning provides you with any temperature and relative humidity you need. Using "Hygrol" absorbent, it is not expensive to operate, saving the refrigeration commonly used to condense moisture and making re-heat unnecessary in most cases. It gives large capacity with compact, easily-maintained equipment. Ask for Descriptive Bulletins #112 and #121. Address Dept. FI

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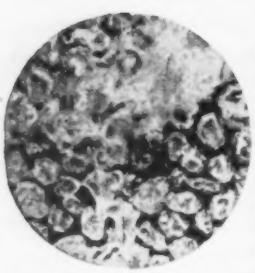
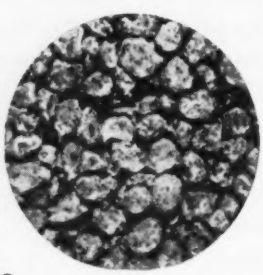
THIS you can depend on. Once materials are mixed in a SIMPSON Mix-Muller *they stay mixed!* Even after prolonged storage . . . or bouncing around in transit . . . where *conventionally mixed* materials tend to *segregate* or *stratify* . . . Simpson-mixed materials retain their *constant stability.*

Segregation can occur only where materials have been improperly mixed . . . where individual grains have merely been placed *next to each other.* Contrast this to *mulling* in a Simpson Mix-Muller, where *each* grain is subjected to a kneading, smearing, mulling action which actually *blends* component materials into *one*. . . where blending is intimate, thorough and uniform.

In addition, SIMPSON Mix-Mullers require less labor, less horsepower, and are safer to operate. You can obtain more information from a National Engineer. *Write for details today.*





(LEFT) Conventionally mixed material showing typical smears of unmixed materials. (RIGHT) Simpson mixed material showing complete uniformity of mix — which will remain in that form even in transit, or after long storage periods.

WRITE FOR LITERATURE

SIMPSON *MIX-MULLER*® DIVISION
NATIONAL ENGINEERING CO. (Not Inc.)
644 Machinery Hall Building
CHICAGO 6, ILLINOIS

Preparing Coffee Cake

Question—Can you supply me with basic directions for making coffee cake dough?

Answer—Thoroughly mix: Sugar, 1 lb.; shortening, 1 lb.; whole eggs, 6 oz.; salt, ½ oz.; and flavor to suit.

Now add: Warm milk, 2 lb. and bread flour, 3 lb. 4 oz.

Add warm milk, 10¾ oz.; yeast, 4 oz.; and cake flour, 1 lb. 4 oz. Mix to a medium dough.

—End—

Hard Butter Coating

—Continued from page 104

For the same reasons, debittered yeast is used. This also enhances flavor of the chocolate liquor and cocoa powder, while providing antioxidant properties.

As interest continues in the use of domestic vegetable fats, so will the research on the application of sequestering agents. These agents will counteract metal contamination picked up by cocoa powder during refining and thus curb oxidative rancidity.

Making the Synthetics

Big strides are now being made at the Al-Chem clinic in the development of a synthetic chocolate liquor. Closest to the true chocolate liquor is a synthetic comprising a blend of 15 lb. each of light-, medium-, and dark-toasted cereals, with ½ lb. of citric acid, ¼ lb. of vanillin, ¼ lb. of ethyl vanillin, and ½ lb. of synthetic chocolate flavor, 2 lb. of debittered yeast, all made up to 100 lb. with vegetable fat (94-103-deg.-F.M.P.).

Formulations for the liquors are being pilot-plant made at this laboratory by pulverizing domestically toasted cereal grains in a specially designed stainless steel micro-atomizer capable of producing over 148,000 impacts per minute. Finely pulverized cereals are then intensely mixed with synthetic chocolate flavors and hardened vegetable fats in a miniature Morehouse mill, shearing and dispersing through Aloxite stones traveling at 3,500 rpm.

From these synthetic liquors are prepared various hard butter coatings —10% of the synthetic for the milk coating, 15% for a light kind, and 35% for a bittersweet "chocolate-type." These finished formulations are then subjected to severe, varying temperatures and humidities.

Checked, too, is the plasticity of the coatings with a Brabender Plastograph. Plasticities are graph-recorded

as coatings go through heating, seeding, tempering, and cooling cycles. And an imported Neilson "baby" enrober is employed to duplicate actual plant coating operations.

Improvement of these synthetic liquors is seen being won with artificial chocolate flavors coming out of flavoring houses and consulting laboratories. And these artificials bid fair to take the place of cocoa beans in the same way that synthetic vanilla flavors replaced the vanilla beans.

Analyzing the Principles

Studies are now going on to break down the flavoring principles in the cocoa bean in an effort to synthesize them. As a matter of fact, many of the flavoring principles are known today. Volatile oils, with a strong chocolate odor and flavor, have already been extracted from the beans.

Porosity, or moisture permeability, of hard butter coatings is being checked with standardized chocolate. According to lab data and shelf studies, confectioners' coatings containing emulsifiers have shown less moisture losses than chocolate—even when tested on such high-moisture candies as creams, nougats, and marshmallows.

End (Resume reading on page 105)

Jet Refrigeration

—Continued from page 89

the smaller unit (photos) is motor-driven (10 hp.) at a speed of 3,450 rpm., and it can chill 12,000 lb. of beef. A medium-sized unit rotates at 1,750 rpm. and can handle 60,000 lb., while a large one, rotating at 1,140 rpm., chills 120,000 lb.

In operation, cooler-room air (34 deg. F. and 100% R. H.) passes through a grill and then enters the 4-stage axial-flow fans. Air alternately flows through the four fans (from 12 up to 45 in. dia.) and diffuser vanes at a speed of 5,000 ft. per min. Fans compress the air to a pressure of 0.65 psi. above atmospheric (14.7 plus 0.65, or 15.35). Diffuser vanes (4) alternately straighten and guide the air to the last three fans and turbine.

Leaving the 4-stage axial-flow fans, the air rises in temperature to 42 F. and relative humidity drops from saturation to 72%.

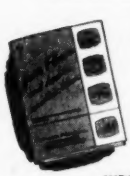
Air now moves over fin-type cooling coils at a rate of 1,000 fpm. Air pressure at this point still remains at 15.35 psi. Coils cool the air to 35 F. and raise R. H. to 96%.

Finally, air is discharged from the turbine at a velocity of 6,000 fpm.

Whether you have a new concrete floor or are refinishing an old one, the Multi-Clean Method is fast and economical. It fortifies concrete against abrasion and the devastating effects of excessive water, grease, oils, alkali, soaps and other chemicals. It prevents concrete dusting, pitting and chipping . . . gives you a hardened, completely sealed floor in a wide range of permanent non-fading colors and natural. You'll get better service and greater safety with added beauty and longer life from your concrete flooring when you use The Multi-Clean Method.

MULTI-CLEAN cuts hours off maintenance time!

The Multi-Clean Method saves many hours of floor maintenance time. Sweeping is easier, more effective and wet moppings become less frequent. Periodic steel wool buffing loosens stubborn dirt and restores the finish.



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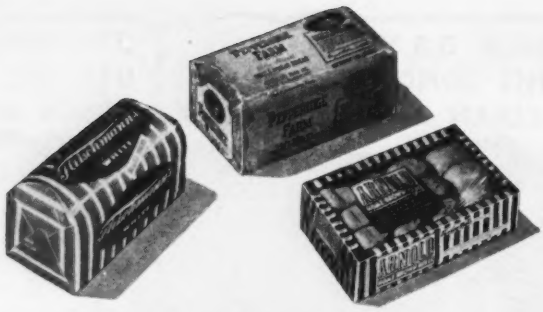
For more information, use coupon on last page.



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Regardless of size or shape, you get a neat, tight wrap on every package with a Hayssen automatic wrapping machine. *Wrapping's easier!* Also, production men report savings up to 80% over previous wrapping costs.

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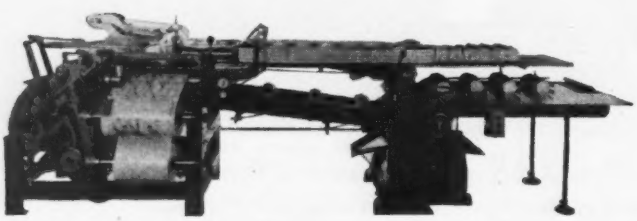
Hayssen's simple, rugged design, using fewer moving parts, keeps these machines working and saving through years of dependable, trouble-free service. Every moving part is in the open and easily reached for maintenance and cleaning.



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Air that is fan-fed into the turbine expands so that its pressure drops to normal. Meanwhile, the air becomes supersaturated (about 25% above saturation) and its temperature is lowered to 29 F. This supersaturated air is then discharged into the cooler. (Maintained in a conventional cooler are average 34-F. temperatures and 80–85% humidities.)

The small, pilot-model unit (photos) takes up 2½x2½x5 ft. of floor space. The actual commercial model will be ceiling-suspended to free valuable floor space. This unit also will have a 10-hp. motor driving fans and turbine and a 3-hp. motor operating the compressor.

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3. Compressor operates more efficiently and economically as well as at greater capacity. Reason is that the compressor runs at a higher suction pressure because of the elevated temperature of the cooling surface.
4. Because of high air velocities employed, unit can pack a tremendous amount of refrigeration capacity in a relatively small space.

End (Resume reading on page 90)

Sanitation Fine Points

—Continued from page 82

direct plating in agar, but sometimes enrichment techniques are necessary to demonstrate presence of spoilage bacteria. These checks can be carried out by inoculating sterile milk with a larger quantity of water, incubating at a low temperature such as 40-45 deg. F. for several days, and then plating the milk and observing for development of psychrophilic spoilage types.

If attempts are made to reproduce spoilage defects by inoculating test lots of cheese with suspected bacterial cultures, the pH of the curd should be adjusted to a pH of 5.2 to 5.4 to enable more rapid growth of the bacteria.

Above article, approved for publication as Technical Paper No. 871 by the Director of the Oregon Agricultural Experiment Station, is a contribution of the Department of Bacteriology, Oregon State College.

End (Resume reading on page 83)

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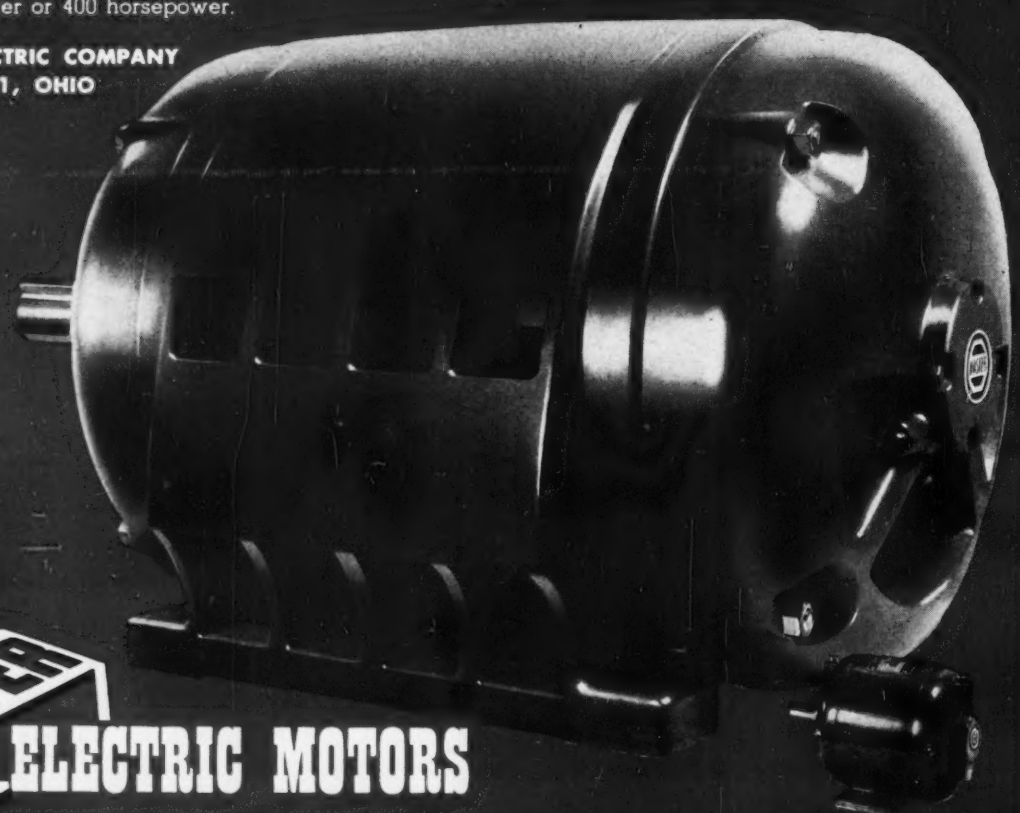

MASTER ELECTRIC MOTORS

Useful New Books & Government Publications

Betty Crocker & Co.

BUSINESS WITHOUT BOUNDARY. *By James Gray. Published by University of Minnesota Press, Minneapolis 14. 1954. 343 pages. 6¼ x 9¼ in., cloth. Price: $4.75.*

The growth of Betty Crocker as a trade symbol and a housewives' byword is only one of the many fabricating facets of General Mills history covered in this book. The development of the company since 1928 is a valuable exploration of careful management, planning, and growth.

Primarily a milling company, General Mills has also left its mark on such widespread projects as radio commercials and aeronautical research. As a member of the food industry, General Mills has contributed much toward development of new processes and new products.

Illustrated with photographs, the book is of great interest to food industry men, tracing as it does, the progress of a farsighted and improvement-seeking corporation.

Designing Packages

PACKAGING ENGINEERING. *By Louis C. Barail. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, 1954. 407 pages. 6¼ x 9¼ in., cloth. Price: $9.50.*

Packages from bourbon barrels to aerosol cans are discussed in this comprehensive work. Fully illustrated with photographs, diagrams, and charts, the book covers packaging materials, and their applications, as well as modern packaging methods.

Labeling, package design, protection—all aspects of packaging are covered, with special chapters on packaging for the armed forces and packaging for export.

Designed as a standard reference work for the packaging industry, the book is of definite value to food processors.

Meat Technology

MICROBIOLOGY OF MEATS. *Third Edition. By L. B. Jensen. Published by Gerrard Press, 119-123 W. Park Ave., Champaign, Ill. 1954. 422 pages. 6¼ x 9¼ in., cloth. Price: $6.00.*

Completely revised and including six new chapters, this book brings the meat processor up to date on the many advances made in the field since the second edition was published in 1945. Written by a man active in the research field, it includes new data on cured meats, freezing and cold-storage of meats, organoleptic entities of microbiological origin, bacterial spores and canned meats, and storage of canned and packaged meats.

Exhaustive references have been included along with a general index directed at the student reader.

Refrigeration Reference

AIR CONDITIONING REFRIGERATING DATA BOOK. *Published by American Society of Refrigerating Engineers, 234 Fifth Ave., New York 1. 1954. 980 pages. 6¼ x 9¼ in., cloth. Price: $7.50.*

Revised to include information on the latest technical advances in the refrigerating and air conditioning industries, this book offers four main sections covering theory, physical data, application design, and basic equipment.

Over 3000 illustrations add to the comprehensiveness of the work. Charts, graphs, and a complete glossary and index are also included. It has a place on the reference shelf of all food processors concerned with refrigeration and air conditioning.

Reports and Booklets

RICE ENRICHMENT IN THE PHILIPPINES. *By W. C. Aalsmeer, K. Mitra, I. A. Simpson, N. Orbando. Published by Food and Agriculture Organization of the United Nations Rome, Italy. 1954. 109 pages, paper. Price: $1.00.* Detailed account of the nutritional, commercial, and administrative aspects of rice enrichment in the Philippine Islands.

AMA CORPORATE TAX SUMMARY OF THE 1954 INTERNAL REVENUE CODE. *By William A. Kunstler. Published by American Management Assn., New York. 1954. 45 pages, paper. Price: $2.75 ($2.00 to AMA members).* Intricacies and specific problems of the tax laws are outlined.

CO-OPERATIVE HYBRID MAIZE TESTS. *Compiled by R. W. Jugenheimer and R. A. Silow. Published by Food and Agriculture Organization of the United Nations, Rome, Italy. 1954. 145 pages, paper. Price: $2.00.* Report on the results of co-operative hybrid maize tests in European and Mediterranean countries in 1951.

ESTABLISHING A NATIONAL CONSUMER PANEL FROM A PROBABILITY SAMPLE. *USDA, Marketing Research Report No. 40, 28 pages. 20 cents.* Summarizes results of an effort to establish a consumer panel by following probability sampling procedures; limited to associated problems.

FE REPRINTS AVAILABLE

Listed below are special sections, flowsheet book, and articles from past issues of FOOD ENGINEERING which are available in reprint form. Single-copy prices are listed. For orders of 20 or more, there is a 25% discount. You order the reprints by circling the corresponding numbers on the Reader Service Coupon, inside the back cover. You will be billed when your order is filled.

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Ten timely articles are included: (1) Dairymen Face Challenging Changes. (2) New Processes for Instant Dry Milk. (3) Controls Presage Automatic Dairy. (4) Save With Cleaned-In-Place Pipes. (5) Bi-Oxidation Solves Waste Problem. (6) Cheese Keeps in Antimycotic Wrap. (7) Plastic Tank for Milk Trailers. (8) Bulk Handling Aids Processors, Too. (9) Advanced Dry - Milk Flowsheet. (10) "Tracers" Detect Foreign Fats.

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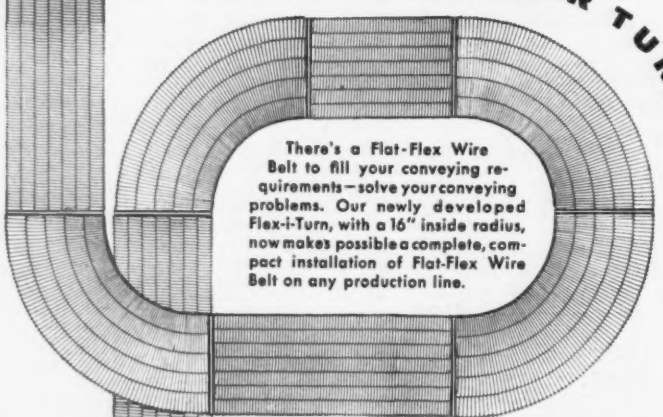

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Accurate Weighing

—*Continued from page 88*

allowance made for the weight of the falling column of material at the instant the scale beam reaches balance) was intentionally fixed to produce light weighings. The weighings are plotted in Fig. 2. No points fall outside the limit lines, but there is a visible shift in the average level of points.

In Table IV the compensation weight was reset. But the agitator providing a uniform stream of material to the weigh hopper was purposely stopped. These readings are also plotted in Fig. 2. The weighings are erratic. One point falls outside the upper control limit. However, note average weighing is about correct.

Step 2—Determine the "average" and "range" control limits: The chart for individual weighings (Fig. 2) is the simplest form of control chart. It serves to warn, but it does not necessarily tell you "findable causes" are altering the process. For this reason, the more sensitive charts for average $\overline{X}$ and ranges R are often used (Fig. 3).

In constructing $\overline{X}$ and R charts, a number of small sample weighings, called sub-groups, were taken. Average value and range of values of each sub-group were determined. Usual sub-group size is four weighings. After finding the average and range for each of the ten sub-groups shown in Table I, the grand average $\overline{\overline{X}}$ and the average range, $\overline{R}$, were also computed.

We then set up trial control limits for the average $\overline{X}$ and R instead of the individual weighings. This is simply a matter of arithmetic. Statistically, the upper and lower limits for averages are given by $\overline{\overline{X}} \pm A_2 \overline{R}$, respectively, and the upper and lower limits for ranges are given by $D_3\overline{R}$ and $D_4\overline{R}$.

The quantities A_2, D_3, and D_4 are derived from σ and depend on the sub-group size. They are standard statistical symbols and are listed in Table V. The left side of Fig. 3 shows the charts made as a result of our initial test of Table I, and the appropriate limit lines have been drawn in. Note that it is customary to place the $\overline{X}$ chart directly over the R chart for ready comparison.

None of the points taken from Table I lies outside the limit lines on either the $\overline{X}$ or R chart, indicating that the process is in control. Whether the limits of this state of control are satisfactory depends on the requirements of the process. In the tests reported, the individual weighings fell within a 3σ limit of approximately $\frac{1}{4}\%$. This is usually considered very satisfactory.

Should a point fall outside the limit

lines of the $\overline{X}$ chart, it means a change tending to affect all weighings because it has been of a nature to alter the sub-group average. On the other hand, a point outside limits on the R chart denotes a change in the uniformity of the process.

Step 3—Set-up limits: Once the initial data have been collected, the charts made, the process found to be in control and within specification tolerances, we are ready to prescribe the limits for future use. Since we do not know what the subgroup average range will be for the future weighings, the limit lines for the X and R charts must be based on σ', the expected standard deviation of the process, and the grand average of the initial study. The limits for averages will be $\overline{\overline{X}} \pm A\sigma$. The central line on the chart for ranges will be $d_2\,\sigma'$, the lower control limit $D_1\,\sigma'$ and the upper control limit $D_2\,\sigma'$. The appropriate values of A, d_2, D_1 and D_2 are given in Table V.

How to Use Charts

To find out if a process is remaining in control, subgroup weighings are taken at suitable intervals, such as each hour. Each subgroup must, of course, contain the same number of consecutive weighings as was used in each subgroup to set initial limits.

Data from Table II, taken a month after the initial study, fall within the limit lines in Fig. 3 and show that a good state of control is still being maintained. The limit lines used for these $\overline{X}$ and R charts in Fig. 3 are based on data from Table I and the weighings show satisfactory control.

Data from Table III (light weights) were then plotted. Three points were found to be outside limits on the chart for averages. The general shift in average is apparent.

The graph for ranges, however, is still in good control. This indicates that the variation within the process is still acceptable but a shift has occurred in the whole *level* of the process.

Data from Table IV (resulting from purposely stopping the agitator in the feed stream) show averages in control, but ranges out of control. One point is almost on the limit lines and two outside. In this case the process level is satisfactory, but the variation within the process unsatisfactory.

This is also proved by further analysis of the data in Table IV. Here, the grand average $\overline{\overline{X}}$ for the 24 weighings is ¼ oz. heavy, but the standard deviation σ' is now 2.43 oz., or almost twice the value of σ' when the process was in a state of control.

End (Resume reading on page 88)

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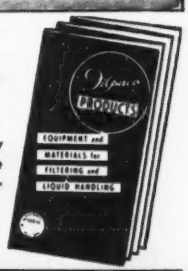

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KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

Algae for Long Pull?

Due to rising populations, a demand for double or even triple food production is foreseen by the year 2000, says Dr. Ernest Volwiler, president of Abbott Laboratories and board chairman of the American Chemical Society. And accordingly we may look forward to the ultimate use in the human diet of algae- or yeast-fed animals.

Deriving of food values, particularly protein, from certain algae and yeasts is seen by Dr. Volwiler as a more feasible future procedure than the more costly hydroponics (the growing of crops in vats wherein minerals and nitrogen nutrients are supplied to the plants in water solutions).

Sweet Corn Costs

Corn may be marketed in the husk about 1c. an ear cheaper than when prepackaged. But both are of equal quality when precooled and iced, according to W. F. Pickett, Kansas State College.

Cooling of sweet corn retards, for at least 3 days, excessive losses of sugar, moisture, and flavor, which occur 12-24 hr after harvest.

Midwest handling costs (per dozen) from farm to consumer were put at: Precooled, prepackaged, 20c.; precooled, unhusked, 8c.; and neither precooled nor iced, 6c.

The study is detailed in Regional Bulletin 45, Kansas Agricultural Experiment Station, Manhattan, Kan.

GI Milk Boost

USDA and QM Corps are increasing Army per capita milk consumption by ½ pt., with a substantial part of the higher cost ($4.10 per cwt.) being paid by CCC under arrangements of the '54 Agricultural Act.

Butter, cheese, and dry milk also are being considered by Defense and USDA for inclusion in the plan.

Launch Vanilla Studies

Constituents of natural vanillas will be researched in a new program initiated by the Flavoring Extract Manufacturers' Assn.

Aim is to range known and unknown vanilla extractives, looking toward development of more precise analytical means of evaluating vanillas.

Price-and-Parity Aspects Gaged For Planning by Processors

Food operators should bear in mind that the politics of aiding farmers are going to be high on the agenda of the new Congress, as they were in this year's session that produced the Benson-Eisenhower flexible-support law.

There are probably two things to watch for once again:

(1) Growing strength behind the so-called Brannan Plan of production payments—which lets prices follow the market, then pays farmers the difference between market price and parity out of government funds (this year the plan is being used for wool growers for the first time).

(2) Marketing agreements for fruits and vegetables grown for processing—a hardy perennial that is likely to come bouncing back.

In fact, as part of his acreage control program on wheat, Benson's staff recommended that growers of vegetables for processing should plant no more acres in 1955 than their average for 1953-54. Canners and other food processors put up a stiff fight, however, pointing out the contract relationship between growers and processors that has the effect of holding acreage very closely to actual market demand without all the complicated machinery of government controls and allotments.

Despite this, the Benson-Eisenhower regime has put what appears to be a stamp on Washington thinking in a couple of ways that should please most food processors.

For one thing, processors have got a better break because the so-called businessman's administration has made it easier for the business side of industry to get its views heard.

For another, there's more emphasis on marketing and promotion of consumption. Secretary Benson's strong support of milk vending machines is but one example.

While Benson has been pushing for more "play of the market place" he also has been trying to tap foreign markets and alternate domestic uses to whittle down the surpluses. The new law gives the Secretary more freedom of action.

Meanwhile, USDA reports farm prices dropped 2% between mid-August and mid-September, after climbing about the same percentage the month before. Prices now are about 4.4% below a year ago.

Price-Support Battle

The fight over price-support levels again will be up in Congress. But for the most part, substantial changes aren't likely. Support prices have been announced shortly or will be announced for most of principal commodities. These prices will govern the '55 crop, and some of them will be a floor under market prices well into '56. On some other commodities—dairy products, for instance—present support levels expire in the spring, when new price supports for the next 12 months will be fixed.

The situation, however, permits this general rundown:

Wheat—Average support price for next year's crop, $2.06/bu. (82½% of parity), compared with $2.24 this year (supported at 90% of parity).

So far, not much is being done

(*Continued on next page*)

Stem-Rot Stopper

By painting freshly cut ends of bananas with a new fungicide, stem rot is reported curbed, and thus quality of the fruit may be guarded during shipment and prior to retail sale. The maker, B. F. Goodrich Chemical Co., calls the rubbery-film product Goodrite p.e.p.s. (polyethylene polysulphide). In radioisotope-tracer tests it was shown that the substance does not migrate even 1/16 in. from point of application, so the edible portion of the bananas is unaffected.

New Opportunities and Developments Highlighted at Packers' Meeting

Challenging trends and developments in the meat packing field were reported at the annual meeting of American Meat Institute in Chicago, October 8-12.

H. H. Corey, president of Geo. A. Hormel & Co., predicted remarkable progress in the next ten years as the business becomes more and more one of manufacturing finished consumer-packaged items. Fewer and less abrupt price changes for meat products, with greater opportunity to maintain adequate profit margins, were foreseen. By virtue of better value to the consumer, stated Mr. Corey, it may be possible to demand a selling price well above the average market price of the raw material.

"The vacuumized cellophane package for sliced luncheon meats, for example, is one of many products which, like canned meats, is lifting from our operation the ceiling of perishability and freeing us from bulk merchandise pricing influences. These new consumer-seeking packages are among the promises of a better future," summarized Mr. Corey.

J. Russell Ives, associate director of AMI's Department of Marketing, also commented on the outlook, highlighting these points: (1) 1955 will be another year of large meat supplies, both for meat in total and for processing meats used by the sausage section of the field. (2) Sausage production has about doubled in 15 years. (3) Meat packagers should sell quality and service, not price.

Clarence Nockleby, vice-president, Geo. A. Hormel & Co., cited a 7% increase in total sausage production this year, and a total 1953 poundage of 1,675 million. And he mentioned the opportunity for meat packers to get more than 5¼c. of the consumer's dollar, a figure which has persisted for 30 years.

Technical Progress

Richard Rath, vice-president of Rath Packing Co., pointed up the need for more research, saying that "the status of basic technical knowledge in our own industry is ridiculously small." He cited a Harvard Business School study which found that the average food manufacturer spends 0.3% of gross sales on research, with the figure going to 1% for the smaller companies.

Clyde L. Reed, corrosion engineer, Wilson & Co., reported that corrosion of unit coolers is best inhibited by polyphosphate-silicate mixtures and orthophosphate-boron mixtures. Wilson now is using a specially proportioned inhibitor, W-26, at a rate of 1 lb. per 300 lb. of salt added to the brine.

George Wilson, AMI Foundation, discussed research on additives to sausage and cured meats. Phosphates were added to a 60-deg. sal. pump pickle for hams at the rate of 8 oz. per gal. Then the hams were pumped to 8% of green weight, cured 13 days in 60-deg. cover pickle, and smoked. The yields were as follows: Control and sodium tripolyphosphate lots, 100.9%; sodium hexametaphosphate, 101.6%; and di-sodium phosphate, 99.9%. While yields were not significantly different, treated hams when cut appeared firmer and had less free moisture than the controls. The pH of the hams increased 0.6 to 0.9 units.

For color, those containing sodium tripolyphosphate had the edge. But in overall palatability, hams treated with sodium hexametaphosphate were preferred. However, differences were relatively small.

Addition of phosphates to comminuted meat, such as bologna, produced no measurable benefit with respect to moisture retention, texture, color fixation, or rate of fading.

In another experiment, acceptable color of comminuted meat products was maintained 37% longer with ascorbic acid added, and 55% longer with sodium ascorbate.

about the shortage of Durham and other desired varieties of wheat, complained about by millers and other food processors. Farmers still have the incentive of getting the most bushels per acre, even though market prices per bushel for desired kinds run higher than support prices.

Peanuts–Support price on peanuts is expected to average around 11.5 to 12c./lb. on '55 crop (86% of parity), compared with .122c./lb. (90% of parity) in '54. Little difference is seen here in costs to peanut processors. Meanwhile, USDA has approved a '55 rise to 1,610,000 acres (from 1,588,415).

Dairy Products – Present support programs on these products expire Mar. 31. Butterfat purchases have been around .56c./lb. (75% of parity), and Benson has cited this program as an example of the success of his approach to the supports. Butter consumption has been rising, and government price-support purchases have dropped. Furthermore, there is the $50-million fund to put more fluid milk into school lunch programs, and measures have boosted hopes of disposing of the surpluses.

Rice–Supports for the current crop are at $4.92/100 lb. (91% of parity). And next year they might range down to as low as $4.65 (85% of parity).

Packer Gets QM Certificate

To Harry J. Williams (left), vice-president in charge of plant operations, Wilson & Co., goes Quartermaster Corps' Certificate of Achievement. Making presentation is Col. John D. Peterman, commandant of QM Food & Container Institute. Mr. Williams was lauded for his outstanding services as a founding member and officer of the Research & Development Associates of the Institute. He has played a leading role in applying industrial skills and facilities in solving Armed Forces food and container problems. Among advances have been frozen boneless beef and non-toxic canned bread. Current coordinated efforts center largely upon dehydration of foods, also specialization of flexible and rigid containers.

Making Plastic Milk Truck

A pilot-model all-plastic milk-delivery truck body is now under construction at Strick Co., Philadelphia truck-trailer concern.

Less cost to refrigerate through improved insulating efficiency is predicted for the unit, with curbing of corrosion and prevention of moisture attacking body materials.

The project, under commission from Carnation Milk Co., calls for use in the structure of polyester reinforced by glass fiber. Body will consist of two symmetrical parts bolted together through a neoprene gasket. These halves will contain glass-fiber insulation, as will also the floor and two bulkheads.

Two side doors and a rear door are included in the design of the truck, which will have a ground-to-roof peak height of 8 ft. 4 in., width of 6 ft. 6 in., and length of 17 ft. 10 in.

Hors d'Oeuvres

▶ **Russia boosted lump-sugar production 163 million pounds, and candy output 48 million pounds, in the first half of this year. Sweetness has been in critically short supply over there.**

▶ Bostonians top big-city folks in expenditures for preground hamburger. Spend so much time with beans that they can't fuss with steak.

▶ **Packers made seven-tenths of a cent profit per sales dollar last year, lowest of any industrial or manufacturing group. Meat management watches its margins through a microscope.**

▶ Chemical differences among people may account for their varying tastes. Can it be that one's individual qualities are but scientific peculiarities?

▶ **Chewing gum from vending machines boosts the revenue of an Ohio bus line. Probably keeps the passengers in their seats, too.**

▶ Ninety-five years ago, a little store opened in down-town New York to sell tea from canisters and sugar from barrels. The sign in front read: "The Great Atlantic & Pacific Tea Co." Last year the company did nearly a $4 billion business. It caught up with its name.

▶ **Russia permits private trading in agriculture products, to encourage farmers and increase the urban food supply. Seems the Commies are swallowing free enterprise.**

▶ Spring pack of frozen spinach was down 35%, and the trend to smaller retail cartons continues. Parents are finally giving up!

▶ **Martinis have been pre-packaged as a promotion stunt. The firewater is in one side of a divided heat-sealed translucent envelope, the olive in the other. What next, coin-machine cocktails?**

▶ Despite its oxalic acid, which steals calcium from food, spinach gets a high rating by Nutrition Foundation's Dr. King. So don't say "the h— with it."

▶ **British scientists have freeze-concentrated beer to save shipping space. Beer always has been a particular problem in logistics.**

▶ Asparagus has been put into macaroni. And any day now, somebody will suction-stuff the holes with cheese.

▶ **Ninety-eight percent of the basic material in your body is said to be replaced yearly. So you are what you ate—and drank—in the past 12 months.**

▶ Genghis Kahn's mounted warriors put sun-dried milk and water into leather bottles each morning. Then the jouncing of their horses reconstituted the milk. The point is—you don't need a horse if you buy instant dry milk.

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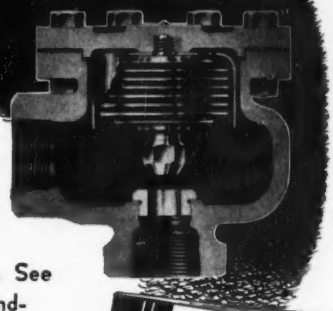

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Almonds, Filberts Tariffed

By Presidential proclamation, a 10c.-per-pound tariff has been levied on imports of almonds exceeding 5,000,000 lb. and imports of filberts surpassing 6,000,000 lb.

Seen is a '55 drop in U. S. consumption of almonds of some 4,000,000 lb. –down to 41,000,000 lb. from a previous average of 45,000,000.

However, consumption of filberts next year is expected to rise to 12,000,000 lb., compared with the former average of 11,400,000 lb.

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Pesticide Tolerances Set; List Seen Pegged in '55

FDA has now announced pesticide residue tolerances for fruits and vegetables moving in interstate commerce. And it has separately outlined procedure for setting new tolerances under the Miller Amendment.

The regulations set tolerances on 26 pesticides, bar residues of 9 others, and exempt 6 materials from the requirements.

It is emphasized, however, that the regulations are tentative—written comments may be submitted up to 60 days after publication (Oct. 20 *Federal Register*), after which final regulations will be issued (probably early in '55).

Fruits and vegetables carrying the insecticides calcium cyanide, dinitro-o-sec. butylphenol and -o-cresol, HETP, TEPP, hydrocyanic acid, or mercury- nicotine or selenium-containing compounds may not legally pass in interstate commerce.

Included in the list of pesticides which may be present, and levels to which they will be allowed, are: Up to 14 ppm. of methoxychlor; 1 ppm. of DDT, Forban, fluorine compounds (F basis), lead arsenate (and for some uses at 1 ppm.), phenothiazine, TDE, Toxaphene, Zineb, and Ziram; 5 ppm. of BHC, 2,4-D, Crag 341; 3.5 ppm. of arsenates and tartar emetic; 3 ppm. of EPN; 1 ppm. of dicyclohexylamine salt of dinitro-o-hexylphenol, napthalene acetic acid, and Parathion; and 0.1 ppm. of aldrin, chlordane, heptachlor, and dieldrin.

If used properly, and not at time of or after harvest, the following pesticides are exempt from tolerance: Common copper compounds (except arsenate); petroleum oils; pyrethrum and rotenone and their synergists, Rvania and Sabadilla.

Because all these specifications are based on four-year-old hearings, manufacturers who feel that newer data justify different tolerances or extensions to different crops can seek modification under Miller Amendment procedures. Companies that have developed new insecticides since '50 must follow similar procedures.

Honor Winners' Round-Up

Awards in various spheres of the industry and allied trades were announced during the month. They included the following:

Brewers' first, second, and third prizes for the best annual reports to stockholders went, respectively, to Anheuser-Busch, Inc. (first-place winner for third consecutive year), Drewery's Ltd., U. S. A., and Pfeiffer Brewing Co. Judgments were made by the Financial World Annual Report Survey.

Award of $1,000 cash and a gold medal, donated annually by Fritzche Brothers, Inc., for outstanding achievement in the field of essential oils and related chemicals, will go to Dr. Hans Schinz of the Federal Institute of Technology, Zurich, Switzerland, in recognition of his extensive work in oil analysis. Presentation of this '55 award will be made in the spring by the American Chemical Society.

Safety awards by National Safety Council were presented to the Can Manufacturers Institute, Folding Paper Box Assn. of America, and Manufacturing Chemists' Assn. Cited were their outstanding anti-accident services to their fields.

National Biscuit Co. gave its maximum employee-suggestion award—$2,500—to D. C. Racburn for his design of a more-easily-assembled, less costly display container.

Milk Output Leveling

Production of milk in '55, says USDA, will run about the same as the '54 total, which is summing up to a round 124 billion pounds.

However, a change in utilization—more going to the consumers as milk and less into production of butter and cheese—is forecast by the Department.

Favor Tuna-Import Quota

Domestic tuna producers now endorse development of a quota system whereby imports of this fish would be limited to a percentage—perhaps about 33⅓%—of the annual U. S. market.

This new stand is confirmed by James B. Lane, president of Westgate-California Tuna Packing Co.

Increased pressure of the problem is related to the rise in importations of fresh frozen tuna (duty free) for canning here, and tuna and bonita canned in brine (a lower duty).

It is noted that a bill to up tariffs died in the Senate in '52.

9 of 11 Egg-Quality Factors Now Gaged Mechanically

All but two of the eleven major factors contributing to egg quality can now be determined mechanically, according to USDA Researchers Dr. A. W. Brant and K. H. Norris.

Their findings were detailed in a paper delivered before the recent World Poultry Conference.

Size is gaged by weighing on a moving belt; shape by electronics, employing "feelers"; crack detection is by mechanical tapping and "listening"; strength by applying known stresses to shells; air-cell size is by measuring absorption of radio-frequency; and presence of blood, Pseudomonas rots, shell color and yolk color can be detected and classified according to the egg's light transmitting, reflecting, or fluorescing properties.

The entire quality-checking job finally will be done by machine when means are developed for gaging albumen quality and for "screening" for defects.

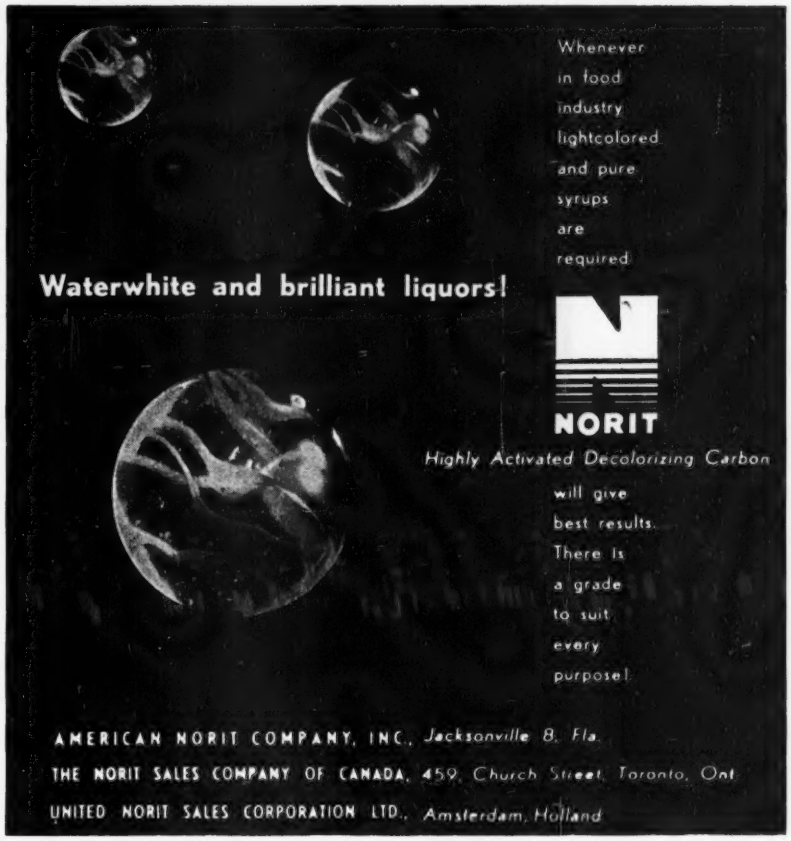
Rise in Industry Spending Shaping Up in '55 Plans

Capital spending already planned for 1955 by the food industry (not including beverages) is put at $548 million in a preliminary survey just completed by the McGraw-Hill Department of Economics.

This represents a 10% rise over the estimated total expenditure for this year of $499 million, which may be compared with actual capital spending of $525 million in 1953.

Planned in '55 by the beverage fields (including distilling) is a total of $138 million. This figure is down 48% from the estimated '54 spending of $265 million. Outlay in '53 was put at $293 million.

Of the food and beverage companies surveyed, 70% foresee sales rising in '55.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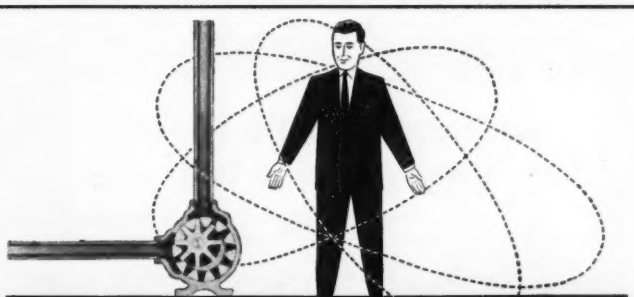

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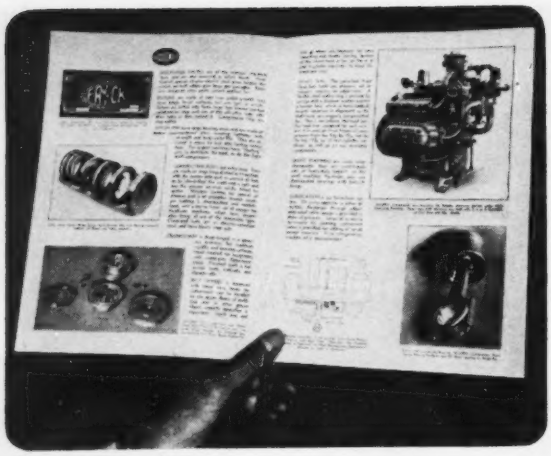

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UNITED STATES STEEL

Briefly . . .

• **MEAT-FIELD ACHIEVEMENTS will be honored by a new annual award—a gold medal and $1,000—established by Dodge & Olcott, Inc., essential oil firm. Recipients will be chosen by a panel of judges recommended by the American Meat Institute and representing research, operating, and engineering. H. M. Corey, president of George A. Hormel & Co., is chairman of the initial award committee.**

• MERGER of Corn Processing Div. of Clinton Foods, Inc., with National Starch Products, Inc., is under discussion.

• **SUCARYL in soft drinks has been given the go-ahead sign in Pennsylvania, following a lower-court decision that the law prohibiting this type beverage is unconstitutional. The State has appealed the decision to the State Supreme Court.**

• MILK-SALES BOOST, reversing the former downward trend, has been achieved in Memphis, says USDA, by elimination of price differentials between regular and homogenized milks and between glass and paper containers, backed by a strong promotional-publicity campaign. Reported is a rise averaging an extra quart per week per family, amounting to a 7% increase over past years.

• **"TIME LOST by workers from accidents of all kinds in 1953 was equal to a year's shutdown of industrial plants employing 1,100,000 men and women."—Emile F. du Pont, director of du Pont employee relations.**

• BOLSTERING factors in the fiscal-year rise of 4% in U. S. farm exports include large shipments of peanuts, cottonseed oil, lard, and tallow.

• **RADIOISOTOPE roles in food preservation and sterilization were reviewed at a round-table session scheduled as part of the National Industrial Conference Board's Third Atomic Energy Conference, held last month in New York City.**

USDA & FDA Standards

Recent USDA and Food & Drug Administration grade and identity standards actions, as reported in the *Federal Register*, include the following:

Grapefruit, Orange, and Blended Juices, canned, revised U. S. grade standards, Sept. 16 F. R., pp. 6023-6030.

Cheeses, Cheese Foods, notice of proposed amendments to definitions and Standards of Identity to allow use of sorbic acid or propionates to reduce spoilage, Sept. 21. F. R., p. 6068.

Catsup, amendment to identity standards to allow use of corn syrup effective date Oct. 9, Sept. 28 F. R., p. 6224.

World Food Shorts

Increased storage life is claimed for harvested fruits and vegetables treated with malein hydrazide, new growth-retarding chemical offered by Svenska Oljeslageri AB, Goteborg 5, Sweden. Treatment is stated to curb development of roots and shoots.

New cold storage plant in Moscow will be Europe's largest, says the Soviet newspaper *Pravda*. The 7-story structure will have 1-ft.-thick low-conductivity exterior panels—instead of the 10-ft.-thick brick walls previously called for in Russian design.

International quality control procedures, also standardization of wood packaging for fruit and vegetables, have been established by the UN's Economic Commission for Europe (ECE). Protocols signed by 16 delegates aim to facilitate trade, increase consumption, and reduce cost of perishable foodstuffs.

Flour enrichment is now mandatory in Cuba. It provides for addition of thiamin, riboflavin, niacin, and iron. Similar legislation is under consideration for enrichment of rice.

Peanut processing equipment will be sought from America by Israel following expansion of this agricultural field. Requirements will include cleaning, grading, and sorting machinery as well as "know-how".

Olive Oil production and trade would be greatly aided by draft of an international agreement, according to an FAO working group recently meeting in Rome. Recommended are increased industrial efficiency, improved quality of oil, and assurance of supplies and promotion of demands to offset fluctuations. An international conference may shape up.

Powdered-milk manufacture will be launched in Colombia in '55, on completion of a new dehydrating plant to process 15,800 gal. of milk daily. The project is sponsored by UNICEF, which will jointly finance it with the government.

A new beverage product is being offered by Nutral C.A., of Caracas, Venezuela. Called "Nutravena," it is made of oats and powered milk and put up in cans. Company advertising heralds the drink as both nutritious and refreshing.

Brazil's food problems can be solved by efficient use of national resources, according to report of the Klein & Saks Mission (Washington, D. C.). It's stated the country could become

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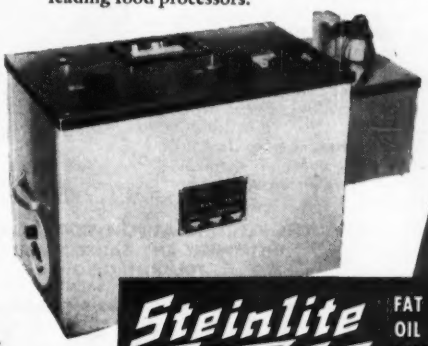

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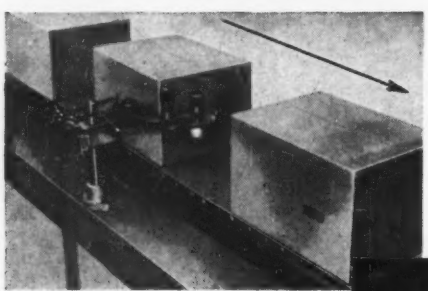

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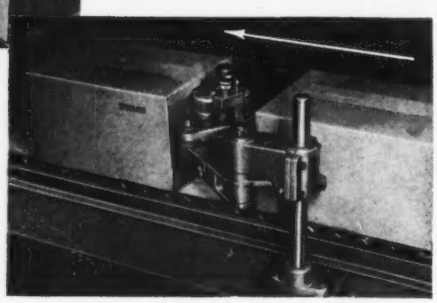

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15–18—International Soft Drink Industry Exposition; Convention Hall, Philadelphia.
15–19—Gulf & Caribbean Fisheries Institute, annual meeting; Hotel Nacional de Cuba, Havana, Cuba.
30-D2—Southern Assn. of Ice Cream Manufacturers, annual convention; Vinoy Park Hotel, St. Petersburg, Fla.

December

2–3—Tri-State Packers Assn., annual convention; Lord Baltimore Hotel, Baltimore, Md.
7—Eastern Frosted Foods Assn.; Bel mont-Plaza Hotel, New York City.
8-11—Assn. of Sugar Technicians of Cuba, annual conference; Cienfuegos, Cuba.

January '55

9–11—Northwest Frozen Foods Assn.; Olympic Hotel, Seattle.
12–13—Northwest Canners Assn., annual convention; Olympic Hotel, Seattle.
24–26—National Dairy Council, mid-winter conference; La Salle Hotel, Chicago.
24–27—American Management Assn., general management conference; Hotel Statler, Los Angeles.
24–27—National Potato Chip Institute, annual conference; Sherman Hotel, Chicago.
27—Dairy Products Improvement Institute, annual meeting; Hotel Commodore, New York City.

a large exporter of meat, dried fish, corn products, and innumerable canned goods—to an extent equaling its foreign exchange revenue from coffee. The Mission advises broad installations of new food processing, transport, warehousing, and cold storage equipment.

Meat-tissue factor responsible for stiffening and shortening of muscles after death has been identified, according to a London report, as the protein myokinase, an enzyme promoting a contractile reaction. Biochemist J. R. Bendall is credited for the finding, seen as having an important bearing in improving treatment of cold-stored and frozen meats.
—McGraw-Hill World News

—*End*—

Easy Does It

—*Continued from page* 105

nery. And when the cannery had sufficient corn for processing, corn then was flight-conveyor loaded into the 3-ton-capacity yard wagons for storage prior to later unloading onto the conveyor feeding the cannery.

Required to carry out this work were 3 tractors, about 70 wagons, and 17 men.

In the present system, the same amount of corn is handled hourly. But it is now simply unloaded directly from hydraulically dumped trucks—and without reloading of wagons—onto a heavy-duty 7-in.-thick concrete apron of much greater capacity (it's 60x100 ft.). Running 1 ft. below the center of the 200-ton-capacity apron is a 30-in.-wide rubber-belt conveyor carrying the corn to the cannery.

A specially designed tractor pushes each grade-selected, truckload pile of corn onto the conveyor. Sides of tractor are fitted with steel-plates to prevent wheels from crushing the corn.

End (Resume reading on page 106)

Foremen Training

—Continued from page 118

particularly in so far as they concerned failure of the employee, in this specific case, to follow established grievance procedure?

6. How did the group's thinking compare with the arbitrator's reasoning and decision?

7. What action should the company and the union officials take upon receipt of the decision from the arbitrator?

Probably most important were the attempts to compare the problem to similar maintenance situations at Atlantic Gelatin.

However, in some of the other cases, where the job functions being emphasized were relatively unfamiliar to the members, the group contributed significantly less.

This was most noticeable in cases involving sales and purchasing. In these instances, discussions were limited almost entirely to questions from the group and answers from the leaders.

Trainee Reaction

Both interim and post-program comments were solicited from those who participated, and these expressions represent an almost unqualified endorsement of this type of training.

The two supervisors who served as leaders were particularly enthusiastic. As to the method itself, which all described as stimulating and challenging, the typical trainee's comment was, "Best type of training we have ever had." The members were unanimous in urging that the company employ the program for all supervisors.

The staff of the personnel department assumes a somewhat more cautious viewpoint. But it feels strongly that the method was of significant value, while being conscious of the fact that this trial run was made with a group of volunteers who, every step of the way, were taken into our confidence.

To some extent, then, the training was "student-centered"—an approach which has been found to be the best weapon against training resistance.[3]

The program seems to have measured up very well, both as to original objectives and in its numerous by-products.

Members of the group unquestionably received some excellent training in human relations. Also they had valuable practice in applying practical judgment to problems generally having human relations aspects. And they have acquired considerable knowledge regarding business functions with which they were formerly unfamiliar.

Apart from these gains and others concerning improved special skills and leadership ability, one of the most encouraging things about this trial program was the interest and active participation on the part of members.

We realize, however, that the real test is whether the program can be made the source of improved job performance.

The incident process lends itself to full participation because the requirements can be simple, as in the fact-finding phase, where some foremen shine, or at the higher level, as in the generalizing of the final phase, where others may take the lead.

One reason why such participation is important is remarked by Robert F. Bales, who declares "there is probably no adequate substitute for some actual verbal participation of each member."[4]

Improvements Planned

We propose to make some changes when we present a similar program in the future. For example, we now feel that the group should be more representative of the entire supervisory force. Also, we have learned that we must select cases which are simple in their facts, especially for those sessions devoted to functions with which most members are unfamiliar.

In any event, we believe that we have already developed a fine backlog of experience, which will prove extremely useful in future training.

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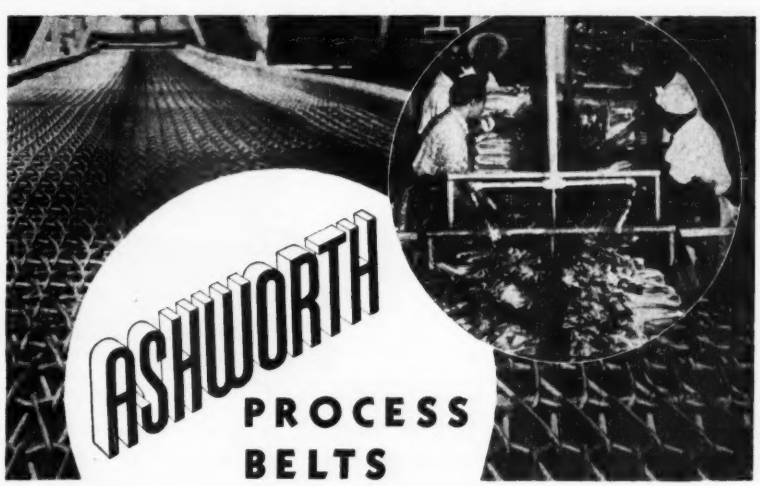
1. Surface, James R., "Resistance to Training." *Harvard Business Review*, Mar.-Apr. 1954.

2. Pigors, Paul, Massachusetts Institute of Technology, forthcoming book on human relations.

3. Services of the Bureau of National Affairs and Prentice-Hall.

4. Bales, Robert F., "In Conference," *Harvard Business Review*, Mar.-Apr. 1954.

End (Resume reading on page 118)



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Recent Inventions

PRODUCTS

Alginate Gel by Mixing Calcium Alginate, Water-Soluble Ortho-Phosphate, Adding Free Acid—*R. H. McDowell, Dipple by Girvan, Scotland to Alginate Industries Ltd., London, England. No. 2,686,127. Aug. 10, 1954.*

Dextransucrase by Culturing *Leuconostoc Mesenteroides* in Sucrose Medium at pH 6-7, Acidifying, Separating Bacterial Cells—*H. M. Tsuchiya and H. J. Koepsell, Peoria, Ill. to USA No 2,686.147 Aug. 10, 1954.*

Phosphatide Composition Comprising Phosphatides and Glycerides Derived From Soybean Oil—*N. W. Myers to A. E. Staley Co., Decatur, Ill. No. 2,686,190. Aug. 10, 1954.*

Pie Crust Mix With Flour, 30-45% Soft and Hard Shortening—*R. W. Callaghan and L. H. Dorger, Minneapolis, Minn. to General Mills Inc. No. 2,686,721. Aug. 17, 1954.*

Candy Coloring Mix Comprising Fat, Sugar, Dried Milk, Fat-Insoluble Dye—*S. Goldstein, Forest Hills, N.Y. to Loft Candy Corp., Long Island City, N.Y. No. 2,-686,722. Aug. 17, 1954.*

Antioxidant Composition Comprising 2-Tert-Alkyl-4-Alkoxyphenol Plus Metal Deactivator—*J. A. Chenicek, Bensenville to Universal Oil Products Co., Chicago. No. 2,686,723. Aug. 17, 1954.*

Fat and Oil Stabilizer Containing Di-Substituted-Aminomethyl-Dihydroxy-benzene Plus Oxidation Inhibitor—*J. A. Chenicek, Bensenville to Universal Oil Products Co., Chicago. No. 2,686,724. Aug. 17, 1954.*

PROCESSES

Forming Skinless Sausage by Filling Mix Into Mold, Setting by Partially Coagulating Protein With Heat—*J. J. Prohaska, La Grange, to Swift & Co., Chicago. No. 2,685,518. Aug. 3, 1954.*

Peanut Product by Grinding Shelled Raw Peanuts, Adding Water, Forming Dough in Thin Pieces, Cooking—*H. W. Moore, Concord, Calif. No. 2,685,519. Aug. 3, 1954.*

Introducing Superheated Steam Into Enclosed Canning System, Cooling Filling Zone With Sterile, Non-Aqueous Gas—*W. M. Martin, San Mateo, to James Dole Engineering Co., San Francisco. No. 2,685,520. Aug. 3, 1954.*

Compacting Material on Conveyor Belt by Passing Over Transverse, Concave, Vibrating Supports—*L. W. Kinney, Winchester, Mass. and J. H. Grace, Portsmouth, N. H. to J. W. Greer Co., Cambridge, Mass. No. 2,685,955. Aug. 10, 1954.*

Dry Flour Matured With Perhydrate of Particle Size Less Than 20 Microns—*P. H. Margulies, Buffalo, N. Y. to Buffalo Electro-Chemical Co., Tonawanda, N. Y. No. 2,686,125. Aug. 10, 1954.*

Canning White Rice by Soaking, Partial Cooking, Vacuum Packing at 45-60% Moisture Content, Heat-Processing—*R. L. Roberts, Walnut Creek, Calif. to USA. No. 2,686,130. Aug. 10, 1954.*

Treating Citrus Waste by Aerobic and Anaerobic Fermentation of Sugar to Alcohol, Then Anaerobic Digestion to Methane, Carbon Dioxide, Digested Solids—*A. M. Buswell, Urbana, and C. S. Boruff, Peoria, Ill. No. 2,686,146. Aug. 10, 1954.*

Treating Crude Glyceride Oils and Fats With Dry Steam to Hydrate, Remove Non-Oil Impurities—*B. M. Watson, El Monte, Calif. No. 2,686,193. Aug. 10, 1954.*

Dispersing Partially Alcohol-Soluble Dye in Master Color Mix of Fat, Sugar, Dried Milk by Adding Fat-Insoluble Dye, Dissolved in Non-Toxic Solvent, Evaporating Solvent—*S. Goldstein, Forest Hills, N.Y. to Loft Candy Corp., Long Island City, N.Y. No. 2,686,722. Aug. 17, 1954.*

EQUIPMENT

Insulated Rail Car Door Comprising Outer Metallic Panel, Reinforcing Stiles and Rails, Attached Webs and Flanges and Insulation Between Outer and Inner Members—*H. H. Henricks and C. E. Johansson to Youngstown Steel Door Co., Cleveland, Ohio. No. 2,682,323. June 29 1954.*

Automatic Traffic Control for Conveyer Having Arms Pivoted on Frame, Locking Element for Preventing Motion—*W. Bisset, Port Hope, Ontario, Canada, to Mathews Conveyer Co., Ellwood City, Pa. No. 2,682,329. June 29, 1954.*

Continuous Sieve Inclined at 3 deg. to Horizontal, Operated at 1500 Vibrations per Min., With Means for Product Feed and Recovery—*J. Hurst, Mayfield, England, to Russell Construction Ltd., London, England. No. 2,682,338. June 29, 1954.*

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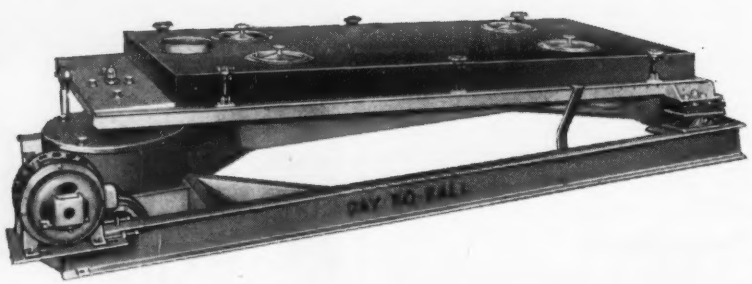

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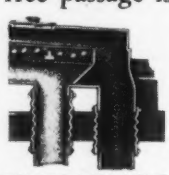

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Flap-Like Extensions at Ends of Side Panels—*M. Larson and A. L. Stedman, Massillon, and F. T. Dannemiller to Convoy, Inc., Canton, Ohio. No. 2,682,362. June 29, 1954.*

Liquid Food Sterilizer With Longitudinal Jacketed Conduit, Plurality of Direct-Heating Ports, Product Inlet, Discharge—*K. E. Gressly, Konolfingen, to Ursina A. G., Konolfingen, Switzerland. No. 2,682,827. July 6, 1954.*

Citrus Extractor Having Vertical Outer, Eccentric Inner Drum With Knurled Fruit Contact Surfaces, Different Rotating Speeds, Juice Collecting Chute, Pulp Disposal—*R. G. Lohre and J. L. Pitzer, Dunedin, Fla., to Extraction Inc., Dayton, Ohio. No. 2,682,832. July 6, 1954.*

Corn Dough Processing Machine Comprising Forming Rolls, Longitudinal Scraper Wire, Supplemental Mounting, Tensioning Means—*I. J. Filler, Atlanta, Ga. No. 2,682,839. July 6, 1954.*

Valve Mechanism for Flushing Pipe Line Milking Systems—*W. E. Ozmina, Chicago to International Harvester Co. No. 2,682,880. July 6, 1954.*

Washing Machine for Cases, Cans, and Crates Comprising Elongated Open-Top Tank, Carrying Belt, Plurality of Longitudinally Spaced Pipe-Frame Sprays—*J. J. Bocchino, Dover, N. J. No. 2,682,881. July 6, 1954.*

Citrus Juicing Machine With Reciprocating Cup-Shaped Fruit Holders, Conical Reamer—*G. W. Whitehead, Sacramento, Calif. No. 2,682,900. July 6, 1954.*

Vegetable Slicer Having Pivoted Vertically Reciprocating Blade, Channel-Shaped Trough, Uni-Planar Gage Plate—*E. Morris, Geauga Lake, Ohio. No. 2,682,901. July 6, 1954.*

Overhead Conveyor Loading and Unloading Device Comprising Fixed Guide Tracks, Vertical Up and Down Sections Between Points of Different Elevation, Endless Chain Drive, Horizontal Rocking Bar Connecting Spaced Rollers for Projecting Attached Article Carrier Into Receiving and Discharge Positions—*D. M. King, Hitchin, England. No. 2,682,946. July 6, 1954.*

Portable Bulk Material Loader With Elongated Conveyor Trough Enlarged at Receiving End to Constitute Open-Topped Hopper, Power Transmitting and Mounting Means—*V. C. Belt, to Belt Corp., Orient, Ohio. No. 2,682,947. July 6, 1954.*

Multiple Leaf Rotary Filter Comprising Cylindrical Drum, Plurality of Filter Elements, Filtrate Manifold, Bottom Channel, Spray Pipe for Solids Discharge—*F. V. Burman, Phelps, Wis. No. 2,682,954. July 6, 1954.*

Bread Depanning Machine With Oscillating Arms, Conveyors for Receiving Pan Units, Depanned Loaves, Empty Pans—*R. N. Winfree, Lynchburg, Va., and C. R. Bishop, Kansas City, Mo. No. 2,682,961. July 6, 1954.*

Shrimp Deveining and Deshelling Apparatus With Conveyor, Squeezing Device, Bite—*A. B. Yanus, Parma, and L. L. Cerny to Alpha Shrimp Machine Corp., Cleveland, Ohio. No. 2,683,281. July 13, 1954.*

Fowl Defeathering Fingers on Rotary Drum Comprising Flexible Rubber Cylinder, Plurality of Fine, Coarse Annular Corrugations for Low, High Pressure Plucking, Respectively—*R. W. McKinley, and J. H. Ernstes, to Ashley Machine Co., Greensburg, Ind. No. 2,683,282. July 13, 1954.*

Flow Meter Comprising Closed Channel, Curved Vane, Movably Mounted Gate, Electrical Means to Control Flow, Indicate Rate—*I. C. Brewer, Dayton, Ohio, to USA. No. 2,683,369. July 13, 1954.*

Liquid Level Gage Comprising Face With Tank Outline, Indicating Line Movable by Device Contacting Fluid Surface—*M. M. Borden, Collingswood, N. J., to Simplex Valve & Meter Co., Philadelphia. No. 2,683,372. July 13, 1954.*

Grain Sampler With Rod Member, Reciprocating, Rotating Capturing Cup—*R. W. Gallup, and I. O. Tilly, Downers Grove, Ill. to USA. No. 2,683,373. July 13, 1954.*

Pimiento Coring Machine Employing Vertically Movable Rotary Tubular Members Above Cups Mounted on Endless Chain, Cutting Blades, Core Ejector—*E. Altman, Gray, Ga. No. 2,683,477. July 13, 1954.*

Extensible Lateral Bend Conveyor With Divergent Rotating Shafts,

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Plurality of Endless, Elastic Bands Guided by Grooves in Shaft—*M. H. Rottersmann, Webster Groves, Mo. No. 2,683,523. July 13, 1954.*

Grain Separator and Cleaner Comprising First Set of Vertically Aligned, Inclined Screens Above Second One of Different Mesh, Reciprocating Brush Members, Feed, Product Recovery Means—*F. J. Paul, Fredonia, N. Y. to Huntley Mfg. Co., Brockton, N. Y. No. 2,683,533. July 13, 1954.*

Clamp and Rotating Mechanism for Industrial Trucks With Plate, Support Members, Clamp Frames, Rotatable Stub Shafts—*F. Sherriff, Battle Creek, Mich., to Clark Equipment Co., Buchanan, Mich. No. 2,683,546. July 13, 1954.*

Stamping or Labeling Machine With Endless Carrier, Support Structure, Label Applier, Presser Means, Timing Control—*S. R. Phin, and D. A. Caulford, to Phin Sales Co., Toronto, Ont., Can. No. 2,683,549. July 13, 1954.*

Centrifugal Separator Comprising Cylindrical Rotor, Subdivided Inner, Outer Passages, Fluid Supply Conduit, Plurality of Delivery Connections—*E. L. Ranseen, Chicago. No. 2,683,562. July 13, 1954.*

Grain Dryer Having Outer Cylindrical, Inner Coaxial Shell, Feed Hopper, Combustion Chamber—*E. Martenson and H. J. Davis, Rolette, N. D. No. 2,683,594. July 13, 1954.*

Milk Can Hoist With Rotatably Mounted Wheel, Peripheral Open-Bottom Groove, Load Line Winding on Hub—*R. G. Ferris, Harvard, Ill., to Starline, Inc. No. 2,683,585. July 13, 1954.*

PACKAGING

Cracker Counting and Stacking Apparatus Having Feed Chute Above Reciprocating Member With Stepped Sections, Stacking Means—*J. W. Fay, Villa Park, Ill., to Schulze and Burch Biscuit Co., Chicago. No. 2,684,161. July 20, 1954.*

Composite Bottle Having Base of Secondary Unit in Abutment With Screw Cap of Primary Bottle, Individual Closures—*L. A. Bruns to Crosse & Blackwell Co., Baltimore, Md. No. 2,684,167. July 20, 1954.*

Bottle Cap of Elastic Deformable Material With Annular Groove Interlocking Threaded Neck—*A. B. McGinnis and J. C. McGinnis to Wheeling Stamping Co., Wheeling, W. Va. No. 2,684,168. July 20, 1954.*

Divisible Carton With Two Compartments From Single Rectangular Sheet, Openings in Top Flap Form Carrying Handles—*F. A. Keeler, Rivera, Calif. No. 2,684,178. July 20, 1954.*

Transfer Mechanism for Feeding Open Bags to Filler Comprising Main Frame, Oscillating Arm, Bag Magazine, Transfer Means—*H. J. Dolman, Bristol, England to Consolidated Packaging Machinery Corp., Buffalo, N.Y. No. 2,684,191. July 20, 1954.*

Carton Comprising Bottom Panel Extended to Form Side, End Walls, Inner Wall Members for Insulation—*W. P. Frankenstein, Cincinnati, Ohio. No. 2,684,194. July 20, 1954.*

Resilient Sealing Liner From Fused Vinyl Resin Compound Comprising Polyvinyl Chloride, Dicyclohexyl Pthalate—*E. O. Aichele, Hillside, N. J. to J. J. Mascuch, Maplewood, N. J. No. 2,684,774 July 27, 1954.*

Carton Feeding Apparatus Rotating Normally Flat Carton to Vertical Position for Opening Opposed Sides—*G. C. Currie, B. D. Dans, L. F. Wilkins, and M. B. Dunn, to Dacam Corp., Charlotte, N. C. No. 2,683,959. July 20, 1954.*

Shipping, Dispensing Carton With Side, Top, Bottom, End Walls, Hopper Member Disposed Within—*J. W. Kraus, Cleveland Heights, Ohio. No. 2,684,792. July 27, 1954.*

Container Casing Machine Comprising Endless Parallel Conveyors, Suspended Lever-Grip Tongs, Actuating Means—*S. J. Lewis, Brooklyn, N.Y. No. 2,684,800. July 27, 1954.*

Sealed Bag of Thin Tearable Material Comprising Member Adhesively Fastened Along Loop-Like Severing Line, Actuating Ends for Cutting Access Hole—*H. C. Gerrish, San Luis Obispo, Calif. No. 2,684,807. July 27, 1954.*

Packing Lettuce in Closed Fiberboard Container, Evacuating to Reduce Temperature to 40 deg. F. by Evaporation of Surface Moisture—*R. L. Brunsing, San Francisco. No. 2,684,907. July 27, 1954.*

Carton Closing Mechanism With Cam Plates to Guide Cover Members Inwardly—*A. V. von Haase, Parma Heights, Ohio. No. 2,685,158. Aug. 3, 1954.*

Liner for Rigid Container of Preformed Moisture-Proof Plastic, Filling, Emptying Nozzles—*R. L. Kuss, Findlay, Ohio. No. 2,685,385. Aug. 3, 1954.*

Food Container Coated With Lard Having Minor Proportion Glyceryl Partial Ester of Fatty Acid, to Prevent Adhesion of Proteinaceous Meaty Material—*A. C. Edgar, River Forest, Ill. to Wilson & Co. No. 2,685,521. Aug. 3, 1954.*

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- Only stainless steel or dairy metal parts come in contact with food
- No machine crevices or joints to collect bacteria
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- Easily removable complete hydraulic unit permits instant replacement
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SMALL INSERT: Hopper feed meat slicer

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Vegetable Bunching and Wrapping Apparatus Mounted on Interacting Conveyors—*R. M. Magnuson, Campbell, and M. D. Donovan, Los Gatos, Calif., to S. D'Arrigo. No. 2,685,771. Aug. 10, 1954.*

Pliable Meat Package Comprising Stiff Foil Backing Member, Plurality of U-Shaped Connected Partitions, Transparent Wrapper—*O. E. Seiferth, Madison, Wis. to Oscar Mayer & Co., Chicago. No. 2,686,129. Aug. 10, 1954.*

Carton Equipping Apparatus With Means for Outwardly Folding Side and End Flaps, Removing, Depositing Cans—*J. K. Bruce, Pasadena and T. H. Davis, Alhambra, Calif. to Bruce Engineering Corp., San Francisco. No. 2,685,975. Aug. 10, 1954.*

Dispensing Cap for Carbonated Beverages Comprising Cap, Nozzle, Valve, Liquid, Gas-Tight Seal Member—*D. P. Crockett, Chicago, Ill. No. 2,685,978. Aug. 10, 1954.*

Carton Loading Device Comprising Conveyor, Cylindrical Rotor With Peripheral Pocket for Receiving, Transferring Articles—*J. F. Currivan, Dayton, Ohio to Emhart Mfg. Co. No. 2,685,993. Aug. 10, 1954.*

Packing Disc of Soft Resilient Material With Flat Retaining Ring for Cap of Screw-Thread Bottle—*E. O. Froitzheim, Koln-Ehrenfeld, Germany. No. 2,686,606. Aug. 17, 1954.*

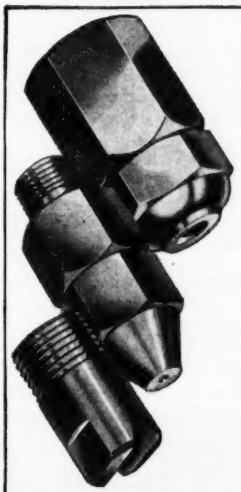
Want more information on any of these recent patents– If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

Olive Packing Machine Having Support, Plurality of Vertically Moving Pick Up Arms, Gripping Devices, Means for Controlling Motion—*C. Haumiller and C. A. Haumiller, Elgin, Ill. No. 2,685,994. Aug. 10, 1954.*

Bagging Machine With Plurality of Holding Trays, Loading, Ejecting, Bag Handling Devices—*R. R. Feeser, Thomasville, Pa. No. 2,685,995. Aug. 10, 1954.*

Wiener Packaging Apparatus Comprising Tapered Trough, Pusher Element, Discharge Member Adapted to Receive Bag—*W. M. Shoffner and U. G. Focke, to Roto-Table Co., Dayton, Ohio. No. 2,685,996. Aug. 10, 1954.*

Cellulosic Casing Material Transmitting 0.00073-0.00355 gm. Moisture per sq. cm. Over 24 Hr. at 58% R. H., 75 deg. F.—*W. G. Grantham, Wilmington, Del. to American Viscose Corp., Philadelphia, Pa. No. 2,686,726. Aug. 17, 1954.*



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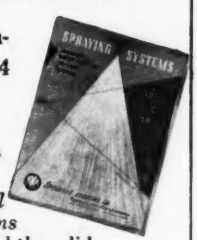

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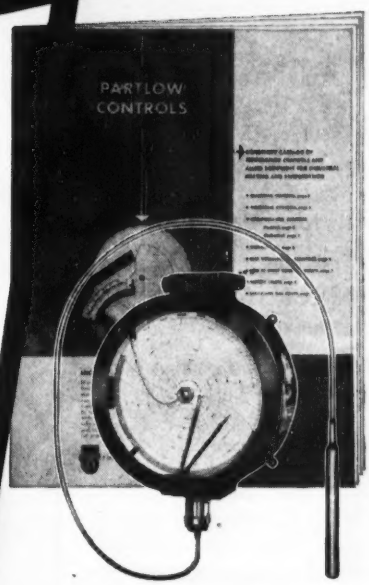

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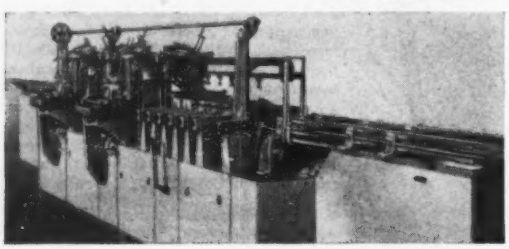

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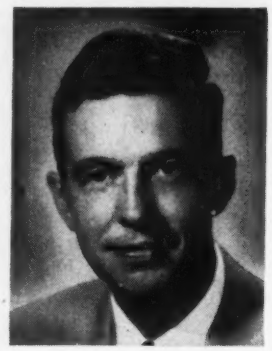


C. L. Delaplane, manager of TreeSweet's Fort Pierce plant since 1948, has been elected vice-president of the company. He will remain in Florida in charge of operations there.

Industry

Arden Farms Co. is building a $300,000 ice cream processing plant at San Leandro, Calif.

Bonell's Bonbonniere, Inc., Charlotte, N. C., has been chartered with authorized capital stock of $100,000.

California Walnut Growers Assn., Los Angeles, will construct a $2.5 million cracking plant in Modesto or Stockton.

Canadian Canners (Western) Ltd., Hamilton, Ont. opened its new $1.5 million canning factory in Vancouver, B. C.

Carling Brewing Co., Cleveland, Ohio, has had its offer of approximately $10 million for the assets of Griesedieck-Western Brewing Co., Belleville, Ill., accepted.

Catelli Food Products Ltd., Montreal, has acquired the assets of Dominion Preserving Co.

Cream Wipt Food Products Co., Philadelphia, has announced the acquisition of the trademark, equipment and rights to exclusive manufacture of Lamaze Sauce.

"Dutchess" Pretzel Corp., new company at Bluffton, Ind., will begin manufacture of both twisted and stick type pretzels on or about Nov. 1.

Herman Falter Packing Co., Columbus, Ohio, is completing a $250,000 program to double present capacity and increase production of smoked meats.

Foremost Dairies, Inc., New York City, has agreed to purchase American Dairies, Inc., Kansas City, through acquisition of the controlling stock interest.

General Foods' International Operations has announced the appointment of Eric D. Haueter as regional manager for Central America, Mexico, and the West Indies.

General Mills, Inc., Minneapolis, began construction of a two-story office building in Park Ridge, Ill., to replace the present quarters in Chicago's Loop.

Hill Brothers Co., makers of the Dromedary line of dried fruits, is making an extensive addition to its manufacturing plant at Lyons, N. Y.

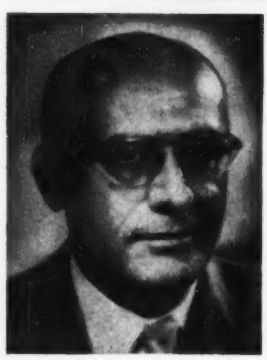
Hilton Seafoods Co. has opened a new Seattle cannery with three canning lines.

Molson's Brewery Ltd., which is considering making a $3 million extension to its Montreal plant, has appointed Campbell L. Smart as general manager.

Montgomery Frozen Foods Co., Montgomery, Ala., will begin construction of a 40,000 sq. ft. frozen food and locker warehouse.

National Biscuit Co. will build a bulk flour storage facility at its Toledo, Ohio, mill to cost $600,000.

National Brewing Co., Baltimore, plans to buy controlling interest in Altes Brewing Co., Detroit, for approximately $2.5 million.



Robert F. Light has been named Technical Director of the Special Products Division of Standard Brands Inc.

Edward W. Priebe, Jr., who was treasurer and director of Priebe and Sons, Inc. for 15 years, has been named manager of egg procurement for the Kraft Foods Co.

Nestle Co., Inc., is reported considering an instant coffee and tea plant near Suffolk, Va.

Pepsi-Cola Co. of Canada Ltd. opened its $1,250,000 plant in Mount Dennis, Ont., and purchased land in Scarboro, Ont., for another plant.

Premier Provision Co., Inc., Oak Park, Mich., has been incorporated by Hyman Brown for $100,000 to manufacture smoked sausage and meat products.

Remar Baking Co., division of Interstate Bakeries Corp., is now making bread under Interstate's Blue Seal label.

C. F. Sauer Co., Greenville, S. C., manufacturers of mayonnaise and relish sandwich spread, will build a new plant at nearby Mauldin to cost between $300,000 and $350,000.

Standard Brands, Inc., New York, concluded negotiations to buy Southern Pecan Shelling Co., San Antonio, Tex.

Sunset-Sternau Food Co., Modesto, Calif., has just completed its new walnut shelling plant.

Sunshine Biscuit, Inc., Long Island City, N. Y., announced it will construct a 25,000 sq. ft. warehouse and office building in the Spokane Valley in the next few months.

Sunshine Packers, Inc., has purchased the Fort Meade, Fla. Alturas Canning Co-operative for $187,000.

Wagner Baking Corp. has elected Gerard R. Williams (president of Williams Baking Co. of Scranton, Pa.) and Robert G. Cowan (president of Natl. Newark & Essex Banking Co., Newark) as new directors.

Welch Grape Juice Co., Inc., announced that it will reopen its Mattawan, Mich., plant to produce grape jam and jelly products.

Personnel

A. T. Augensen, manager of manufacture for American Can Co.'s Pacific Division, has been named manager of the company's Hawaiian Islands operations.

Leonard Bakke has been appointed general manager of Rancho Soup Co. and Sunnyvale Packing Co.

Dr. Arthur R. Baldwin, recently associated with Corn Products Refining Co.'s Chemical Division, will join Cargill, Inc. as Director of Research.

John Blankenship has been named operations manager for the Ottumwa, Iowa, plant of John Morrell & Co.

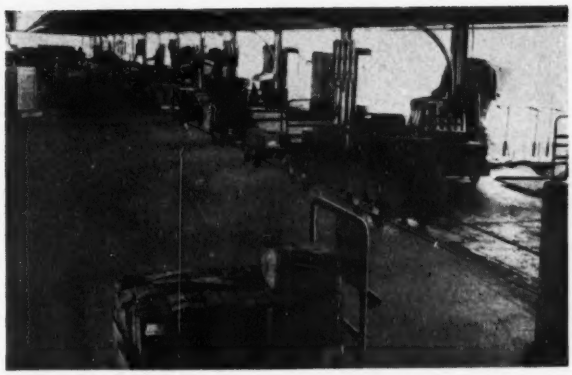
Lester D. Borden has been appointed manager of the Philadelphia branch office of A. E. Staley Mfg. Co.

Milton F. Brown has been elected to the board of Cabell's, Inc., Dallas dairy producers.

William Howlett, formerly president and director of Nesco, Inc., Chicago, is new general manager of General Mills, Inc.'s O-Cel-O division.

Clair Kennedy has been named research manager for Perkins Products Co., soft drink subsidiary of General Foods.

J. R. Pierson was elected vice-president and district sales manager for the Kansas-Missouri territory of Otoe Food Products Co.



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(WHEAT STARCH)

Many food processors now use just *one* starch—Paygel—in place of expensive blends of starches or gums. Perhaps Paygel can do the same for you. Here's why. Paygel is a chemically modified starch created by General Mills for the *food* industry. It has high absorption and thickening power, plus high temperature and mechanical resistance. And Paygel is *bland*—never masks the delicate flavor of your product.

What Paygel Does For Soup

Condensed soups made with Paygel reconstitute readily when diluted and heated prior to serving. Not only will Paygel prevent formation of fat, "scum", or film on the surface, but it will improve body and flavor.

What Paygel Does For Salad Dressing

Paygel in salad dressing makes possible a five to seven per cent starch reduction. Because of the soft, smooth, "buttery" texture of its cooked sols, Paygel can replace blends of starches and gums formerly required for satisfactory body and appearance.

In addition, Paygel prevents bleeding under refrigeration or "setting" while on the shelf.

Write For Free Sample

The above are just a couple of examples of what Paygel can do. If you need a high quality food starch, write to the address below for a free sample of Paygel and technical information.

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Special Commodities Division

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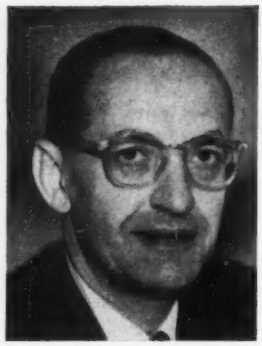

S. J. Meyer, well known in the dry milk field, has been appointed assistant sales manager of Bowman Dairy Co.'s Dry Milk Sales Division and Associate Director of the Bowman Research Bakery.

A. Ross MacKenzie, president of Purity Flour Mills Ltd., has been appointed to the board of directors.

Roy F. Melchior has taken over as president and chief executive officer for Agar Packing & Provision Co., Chicago.

William A. Murray, vice-president and sales manager of H. W. Madison Co., Cleveland, was re-elected president of the Mayonnaise and Salad Dressing Manufacturers' Assn.

E. L. Newman, Louisville, was named vice-president and general manager of Victory Soya Mills Ltd., Toronto, recently purchased by Proctor & Gamble.

S. A. Ranzoni has been elevated to vice-president of S & W Fine Foods, Inc., San Francisco.

H. E. Sandoz, controller, has been appointed vice-president of PictSweet Foods, Inc., frozen food division of Stokely-Van Camp, Inc.

Eugene E. Stone III, president of Stone Mfg. Co. of Greenville, S. C., is new member of the board of directors of Claussen's Bakeries, Inc.

George L. Strayer has been appointed supervisor of production for all plants of General Bakeries Ltd.

Associated Industries

American Can Co. has announced it will form a wholly-owned subsidiary, American Can Co. of Canada, Ltd.

Andre-Kleerwrap Co. has been formed in San Francisco to manufacture folding cartons, beverage carriers, transparent film, wrappers, and other packaging items.

Dodge & Olcott, Inc., has announced the appointment of Hatton B. Rogers (formerly with Huron Milling Co.) to their executive staff as Director of the Dry Solubles Div.

Heyden Chemical Corp. has contracted to purchase all of the outstanding common stock of Nuodex Products Co., Inc. of Elizabeth, N. J., manufacturers of chemical additives.

Kaighin & Hughes, Inc., Toledo, have organized an Industrial Wastes Division with Edmund B. Besselievre as its manager.

Sunroc Co., Glen Riddle, Pa., has purchased White Manufacturing Co., Toledo, manufacturers of cream and hot butter dispensers and other products.

Thatcher Glass Mfg. Co., Inc., Elmira, N. Y., has named Roger V. Rogers manager of its Detroit office.

Fred Todt Co. has named E. Minneman sales manager, to be located in the Los Angeles office.

Deaths

Fred J. Lingham, former president of Federal Mill, Inc., of Lockport, N. Y.—Oct. 11.

Harry C. Massenburg, 62, owner of Dr. Pepper Bottling Co. plant in Florence, Ala.—Sept. 27.

Leslie A. Virkler, vice-president of Blue Moon Foods, Inc., Thorp, Wis.—Oct. 7.

General Walter Bedell Smith, recently retired as Under Secretary of State, is new board vice-chairman of American Machine & Foundry Co.

Just Off the Press

NEW CATALOGS AND BULLETINS: SEND FOR YOUR COPIES BY ENCIRCLING NUMBERS ON READER SERVICE CARD

PLANT ENGINEERING

Delivery Pumps

Details on recent line of packaged variable delivery pumps for both straight line or rotary drive applications. Bulletin 47010. 8 p. —*Oilgear Co., 1560 W. Pierce St., Milwaukee 4.* (223A.)

Vibratory Feeder

Features of heavy tonnage vibratory bulk feeder with maximum capacity of 750 tons per hr. Form F-86.—*Syntron Co., Homer City, Pa.* (223B.)

Rubber Tubing Pump

Models of pumps to force liquids, solutions or gases through rubber tubing. 4 p. bulletin.—*Schaar & Co., 754 W. Lexington St., Chicago 7.* (223C.)

Automation Tools

Illustrated description of uses of motors, drives and electronic controls and regulators combining to provide most efficient automation. Bulletin A-1555. 12 p.—*Reliance Elec. & Eng. Co., 1076 Ivanhoe Rd., Cleveland 10.* (223D.)

Air Filter

Descriptive details and engineering data on filtering system for maintenance-free air cleaning. Bulletin 248. 8 p.—*American Air Filter Co., Inc., Louisville, Ky.* (223E.)

Pipe Threading

Hints on hand threading stainless steel pipe and tubing, with discussion of die stock, dies, speed, cutting oils and assembly of threaded joints. Bulletin TDC-147. 4 p.—*Babcock & Wilcox Co., 161 E. 42nd St., New York City.* (223F.)

Wire Stitching

Information on wire stitching of corrugated and solid fibre boxes and machines and accessories used in process, with illustrations, specifications and dimensions. Bulletin AD 131. 24 p.—*Acme Steel Co., 2840 Archer Ave., Chicago 8.* (223G.)

Turbine Pumps

Information on submersible turbine pumps for wells 4-6 in. inside dia. or larger. Bulletin 6710-20. 4 p.—*Deming Co., Salem, Ohio.* (223H.)

Air Conditioning System

Details on automatic control system for air conditioning. Bulletin 370.—*Powers Regulator Co., Skokie, Ill.* (223I.)

Swivel Joints

Line of ball-bearing swivel joints and other products: loading racks, maring and barge hose, and manifolding lines. Catalog G-4.—*Chickson Co., Brea, Calif.* (223J.)

Control Counters

Detailed description of equipment and techniques for controlling industrial equipment by means of predetermined electronic counters. 20 p. booklet.—*Potter Instrument Co., 115 Cutter Mill Rd., Great Neck, N. Y.* (223K.)

Simplified Boilers

Operation and advantages of packaged type 20-500 hp automatic boilers with simplified design. Bulletin BE-4. 4 p.—*Boiler Engineering & Supply Co., Inc., Phoenixville, Pa.* (223L.)

Gas-Oil Burners

Design features of closed flame gas-oil burners with unique nozzle mixing principle for burning efficiency. Bulletin R-230. 4 p.—*Eclipse Fuel Engineering Co., Rockford, Ill.* (223M.)

Fire Extinguishers

Facts on portable, one-hand operated fire extinguishers of stored pressure, vaporizing liquid type. Bulletin RG-154. 4 p.—*Stop-Fire, Inc., 125 Ashland Pl., Brooklyn 1.* (223N.)

Versatile Plastics

Plastic material to be used as a protective paint, heavy-duty lining, corrosion resistant gasketing, or as molded items. Portfolio.—*U. S. Stoneware Co., Akron 9, Ohio.* (223O.)

Steel Valves

Information on sizes, dimensions, and specifications of pressure-seal cast steel valves. Circular 143.—*Walworth Co., 60 E. 42nd St., New York City 17.* (223P.)

Light-Weight Motor

Engineering details and illustrations of compactly dimensioned variable speed motor. Bulletin 1797.—*U. S. Electrical Motors Inc., Los Angeles 54.* (223Q.)

Pipe Coupling

Illustrations and tabular description of types of ball bearing swivel pipe coupling. Catalog 234-L. 4 p.—*H & N Mfg. Corp., 3525 E. 15th St., Los Angeles 23.* (223R.)

Pump Catalog

Comprehensive listing of line of industrial pumps, with illustrations, performance tables and capacity charts. 108 p. catalog.—*Deming Co., Salem, Ohio.* (223S.)

Valve Operators

Description and illustrations of valve controls for large or small valves. Catalog L-54, 21 p.—*Philadelphia Gear Works, Erie Ave. & G. St., Philadelphia.* (223T.)

Automatic Boilers

Picture and caption presentation of information on packaged automatic boilers to check steam costs. 16 p. brochure.—*Orr & Sembower, Inc., Morgantown Rd., Reading, Pa.* (223U.)

Convertible Generator

Details on convertible high-frequency generator designed for plastic welding and packaging machinery. Form G-554.—*Electronic Processes Corp., 1094 San Antonio Rd., Los Altos, Calif.* (223V.)

Cooling Towers

Five models of cooling towers, with capacities ranging from 3-15 tons, with illustrations. Bulletin 402-A. 4 p.—*Acme Industries, Inc., Jackson, Mich.* (223W.)

Chemical Pumps

Facts on line of centrifugal pumps designed for chemical, food and other process industries. Bulletin 725.4. 8 p.—*Goulds Pumps, Inc., Dept. FG, Seneca Falls, N. Y.* (223X.)

Insulation Uses

Facts on uses of Foamglas to insulate cold storage space. Booklet.—*Pittsburgh Corning Corp., Dept. O-104., One Gateway Center, Pittsburgh 22.* (223Y.)

Cork Insulation

Description of line of cork products for insulation, in pipe covering or corkboard. Manual.—*Mundet Cork Corp., 7301 Tonnelle Ave., N. Bergen, N. J.* (223Z.)

Assembled Compressor

Facts on two-stage, assembled electric-driven compressor unit. Bulletin 3155.—*Ingersoll-Rand, 11 Broadway, New York City 4.* (223AA.)

Pump Info

Features and uses of various pumps. Bulletin 558E.—*Viking Pump Co., Cedar Falls, Iowa.* (223AB.)

Casters & Wheels

Features of neoprene-covered casters and wheels. Manual.—*Darnell Corp., Ltd., 60 Walker St., New York City 13.* (223AC.)

Electric Motor Tests

Report in tabular form of comparative tests of different brands of electric motors as to performance, starting capacity, stalling point, and load efficiency. Brochure 400. 4 p.—*Electro Dynamic Div., General Dynamic Corp., Bayonne, N. J.* (223AD.)

Impeller Pump

Facts on two-stage, opposed impeller centrifugal pump. Bulletin 722.6. 12 p.—*Goulds Pumps Inc., Seneca Falls, N. Y.* (223AE.)

Gate Valves

Line of forged steel gate valves with illustrations and dimensions and trim charts. Form 195. 4 p. —*Ohio Injector Co., Wadsworth, Ohio.* (223AF.)

Condensing Units

Features of compressors and complete condensing units with detailed cut-away photos. Form RLF-3. 6 p. — *Schnacke, Inc., Evansville, Ind.* (223AG.)

Transmission Belt

Design characteristics of single, endless belt with molded lengthwise ribs, with line drawings. Brochure 6638. — *Raybestos-Manhattan, Inc., Passaic, N. J.* (223AH.)

Combination Burners

Horizontal rotary-nozzle mix-type oil-gas burners. Bulletin 176. 4 p. — *Preferred Utilities Mfg. Corp., 1860 Broadway, New York City 23.* (223AI.)

Controlled Pumps

Description and illustrations of how controlled volume pumps can be used as flow and ratio controllers, and final control elements in process instrumentation, Bulletin 1253. 24 p.—*Milton Roy Co., 1300 E. Mermaid Lane, Philadelphia 18.* (223AJ.)

Clutch-Coupling Unit

Application and engineering data on clutch-coupling unit. 4 p. bulletin. — *Formsprag Co., 23601 Hoover Rd., Van Dyke, Mich.* (223AK.)

Steam Traps

Standard reference on advance-type trapping of steam, air and other mediums, with installation diagrams and advice on specific problems. Catalog 953. 32 p.—*W. H. Nicholson & Co., 193 Oregon St., Wilkes-Barre, Pa.* (223AL.)

Bushing Uses

Information on bushings, hubs, and adapters, and illustrated uses, with tables. Bulletin A-628A. 8 p.—*Dodge Mfg. Corp., Mishawaka, Ind.* (223AM.)

Rubber Products

Line of rubber V-belts, transmission belts, conveyor belts, hoses, and molded products, with installation photos. Catalog 25-C. — *Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.* (223AN.)

Equipment Line

Line of chains and sprockets, enclosed gear drives, transmission products, and conveyor components, with flexible cover and thumb index, capacity charts and dimension tables. Catalog 550. 340 p.—*Link-Belt Co., 307 N. Michigan Ave., Chicago 1.* (224A.)

Control Center

Information on packaged motor control center, with illustrations. —*Electric Machinery Mfg. Co., Minneapolis 13.* (224B.)

Steel Pumps

Features of sanitary stainless steel pumps for any liquid, with section charts, and friction data chart. Form 2200. 8 p.—*Creamery Package Mfg. Co., 1243 W. Washington Blvd., Chicago 7.* (224C.)

Compressor Problems

Cartoon presentation of types of troubles arising in air compressors and in pumps. Bulletins PC-305 & PC-306. 4 p. each.—*Worthington Corp., Harrison, N. J.* (224D.)

Motion Transmitter

Facts on 60 cycle ac servomechanism system used in instrumentation for remote transmission of motion. Bulletin 54B. 4 p.—*Richardson Scale Co., Van Houten Ave., Clifton, N. J.* (224E.)

Steam Generator

Detailed data on self-contained, fully automatic steam generator. Bulletin EC-100. 4 p.—*Hapman-Dutton Co., Dutton Boiler Div., Kalamazoo, Mich.* (224F.)

Shaft Mounted Drives

Information on shaft mounted gear drives offering high ratios of speed reduction in limited space, with selection tables, and photos. Bulletin 7101. 8 p.—*Falk Corp., 3001 W. Canal St., Milwaukee 8.* (224G.)

Heating Unit

Characteristics, applications, and specifications of copper-clad electrical heating element for precise heat control. 8 p. catalog.—*Continental Electric Equipment Co., Box 1055, Cincinnati 1.* (224H.)

Valve Varieties

Line of standard 4-way hand, foot, power, solenoid operated, and pilot valves, including dimension, weight, and application information. Bulletin 1010. 16 p.—*Ledeen Mfg. Co., 1600 S. San Pedro St., Los Angeles 15.* (224I.)

Pipe Insulation

Information on properties of low-temperature pipe insulation, with helpful recommendations on how to order and apply it. 4 p. brochure.—*MMM Inc., 7120 Ave. C, Houston, Texas.* (224J.)

MATERIALS HANDLING

Woven Belting

Types of covered woven belting for conveying, inspecting, and sorting. Booklet. — *Globe Woven Belting Co., Inc., 1400 Clinton St., Buffalo 6, N. Y.* (224K.)

Conveyor Belts

Metal conveyor belts in spiral weave, flat wire, or flex-grid for continuous, automatic processing. Catalog 5.—*Cyclone Fence Dept., U. S. Steel Corp., Waukegan, Ill.* (224L.)

Storage Bins

Construction details and applications of vitrified glazed tile industrial storage bins. Bulletin 1153-B. 4 p.—*Kalamazoo Tank & Silo Co., Kalamazoo, Mich.* (224M.)

Syrup Handling System

Advantages of continuous flow handling system for liquid sweeteners, with application photos, sample cost analysis and work sheet. 16 p. brochure.—*A. E. Staley Mfg. Co., Decatur, Ill.* (224N.)

Horizontal Conveyor

Operation features of horizontal closed circuit dust-tight conveyor capable of moving in four directions. Catalog 140. — *Stephens-Adamson Mfg. Co., 86 Ridgeway Ave., Aurora, Ill.* (224O.)

Conveyor System

Information on system for handling bulk materials. Bulletin 529. 24 p. — *Dracco Corp., 4085 E. 116th St., Cleveland 5.* (224P.)

"Package" Conveyors

Description of complete engineered systems of conveyors for production, assembly or packing lines. General Catalog.—*Standard Conveyor Co., North St. Paul 9, Minn.* (224Q.)

Aluminum Trucks

Light-weight, rugged small-size trucks. Catalog. — *Aluminum Cooking Utensil Co., Inc., 408 Wear-Ever Bldg., New Kensington, Pa.* (224R.)

Pallet Truck

Description of lightweight hydraulic pallet truck for use with single face or double face pallets and skid platforms, with photos. Circular 26A.—*Lewis-Shepard Products, Inc., Dept. R-57, Watertown, Mass.* (224S.)

Lift Trucks

Description and photos of methods of moving and storing of multi-loads by pallet hand lift trucks. Brochure P-673B. 12 p.—*Yale & Towne Mfg. Co., 11,000 Roosevelt Blvd., Philadelphia 15.* (224T.)

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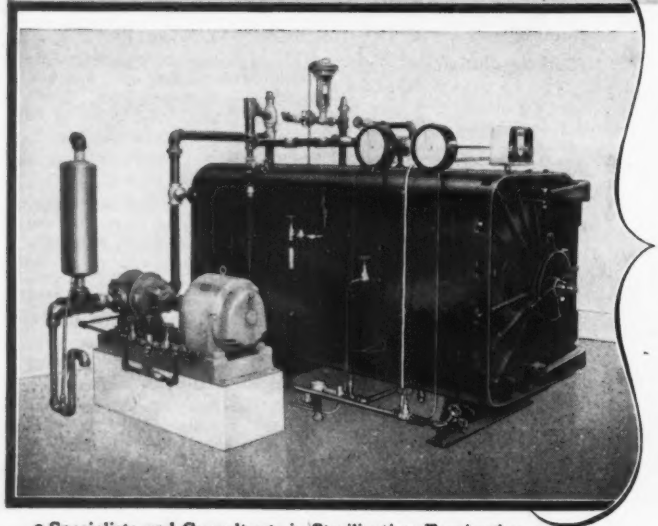

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How the right shipping containers can aid in promoting your product and how to seal containers. Booklet.—*Robert Gair Co., Inc., 155 E. 44th St., New York City 17. (225A.)*

Glass Pipelines

Description of features and uses of glass piping for materials handling. Bulletin EA-1. — *Corning Glass Works, 511 Crystal St., Corning, N. Y. (225B.)*

All-Purpose Trucks

Line of platform, bin, table, shelf and box trucks to fill need of medium duty handling. Folder 73. 4 p.—*Wilder Mfg. Co. Inc., Mechanic St. & Erie R. R., Port Jervis, N. Y. (225C.)*

Storage Tanks

Data on storage tanks and steel plate fabrication, accessories and fittings. Catalog 54B. 24 p.—*Hammond Iron Works, Warren, Pa. (225D.)*

Wire Belt Uses

Discussion of application of automatic operations to continuous production processes by use of woven wire conveyor belts, with application photos. Bulletin 110. 4 p.—*Cambridge Wire Cloth Co., Cambridge, Md. (225E.)*

Tier Boxes

Features of materials handling box midway in size between tote box and heavy corrugated bin-type container. Bulletin BX-360.—*Chas. Wm. Doepke Mfg. Co., Inc., Rossmoyne, Ohio. (225F.)*

PROCESSING

Magnetic Separators

Details on improved magnetizing technique offering greater protection from tramp iron hazards in pipe and chute conveyor lines. Bulletin 275-A.—*Magnetic Engineering & Mfg. Co., Clifton, N. J. (225G.)*

Blending System

Technical reference material on high-ratio continuous blending system, with photos of weighing equipment and control panel comprising the system. Technical Reference 54D. — *Richardson Scale Co., Van Houten Ave., Clifton, N. J. (225H.)*

Continuous Centrifugals

General description and photos of non-cyclic constant speed centrifugals. 10 p.—pamphlet.—*Hepworth Machine Co., Inc., 42-11 Ninth St., Long Island City 1. (225I.)*

High-Pressure Steamer

Description and illustrations of continuous high-pressure steamer. Bulletin.—*Food Machy. & Chemical Corp., Canning Machy. Div., San Jose, Calif. (225J.)*

Mist Eliminators

Operating principles of wire mesh entrainment separators and mist eliminators, also multi-stage extraction column. Bulletin 16, 4 p.—*Otto H. York Co., Inc., 6 Central Ave., West Orange, N. J. (225K.)*

Liquidizing Machine

Features of processor with two-speed agitator and bridge mounted baffle for reducing frozen products to liquid. Bulletin.—*Cherry-Burrell Corp., 427 Randolph St., Chicago 6. (225L.)*

Processing Equipment

Comprehensive line of processing machinery for all food products, with specifications and illustrations. Catalog 5100. 52 p.—*Berlin Chapman Co., Berlin, Wis. (225M.)*

Mixer Models

Types of portable and permanent mounted mixers, with specification tables. — *McNamara Mfg. Co., 3135 Casitas Ave., Los Angeles 39. (225N.)*

Ice Cream Freezers

Operating features, diagrams and photos of continuous freezers for ice cream production. Form 2138-2-53. 8 p.—*Creamery Package Mfg. Co., 1243 W. Washington Blvd., Chicago 7. (225O.)*

Freezer Doors

Construction and design details of door for use on freezers to minus 50 deg., with dimension tables and illustrations. Catalog Sec. 5. 14 p.—*Jamison Cold Storage Co., Hagerstown, Md. (225P.)*

Liquid Chillers

Applications of line of packaged liquid chillers. Bulletin FC-50-C. 4 p.—*Acme Industries, Inc., Jackson, Mich. (225Q.)*

Plate Exchangers

Features of small stainless steel plate heat exchanger, and heavy duty press exchangers. Bulletins E-916 & E-1153. 8 & 6 p.—*Creamery Package Mfg. Co., 1243 W. Washington Blvd., Chicago 7. (225R.)*

Custom-Made Units

Information on line of individualized food plant equipment, including pressure vessels, extractors, mixers, tanks, etc. Catalog 490.—*L. O. Koven & Bro., Inc., 154-D Ogden Ave., Jersey City 7, N. J. (225S.)*

Mixing Oven

Information on small compact unit that tumbles, mixes and bakes loose food products at rates of 300-700 lb. per hour. 2 p. leaflet. —*R. G. White Engineering Co., 1338 Atlantic Ave., Brooklyn 16. (225T.)*

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AGITATOR PARTS QUICKLY REMOVABLE FOR EASY CLEANING

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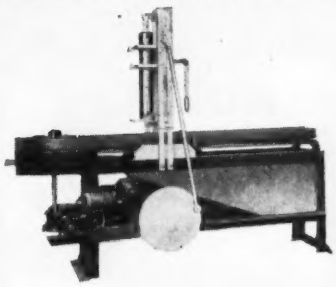

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Of Food Engineering published monthly at Albany, New York for October 1, 1954.

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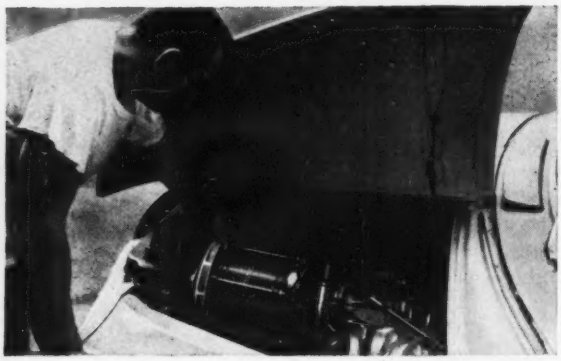

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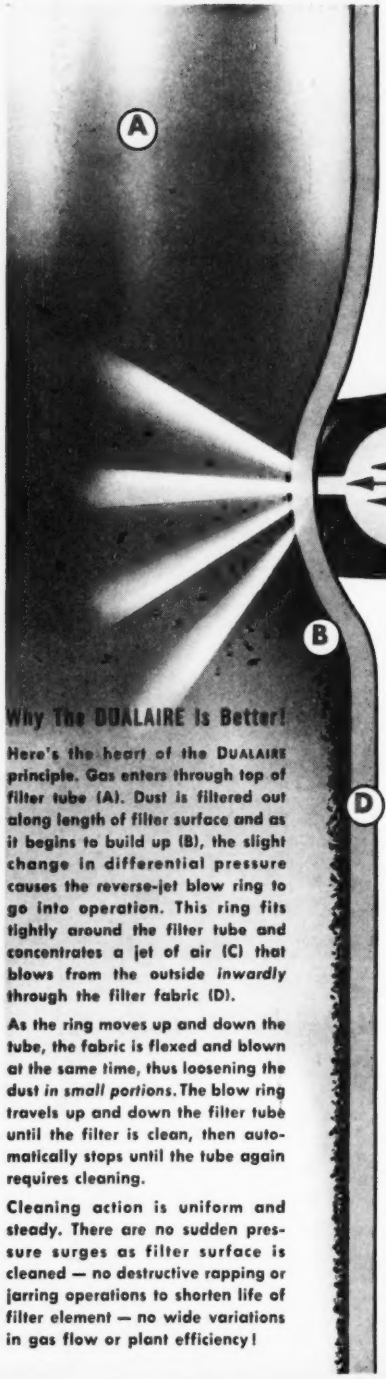

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